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BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, NEWCASTLE, 1863.

ON BOILER EXPLOSIONS.

Mr. P. le Neve Foster read a paper on boiler explosions, before the British Association for the Advancement of Science, at their late meeting, by the Astronomer Royal. It stated—In considering the cause of the extensive mischief done by the bursting of a high-pressure steam boiler, it is evident that the small quantity of steam contained in the steam-chamber has very little to do with it. That steam may immediately produce the rupture, but as soon as the rupture is made and some steam escapes, the pressure on the water is diminished, a portion of the water is immediately converted into steam at a slightly lower temperature and lower pressure; and this, in the same way, is followed by other steam of still lower temperature and pressure, and so on till the temperature is reduced to 212° F., and the pressure to 0. Then there remains in the boiler a portion of the water at the boiling point, the other portion having gone off in the shape of steam of considerable diminishing pressure. From this it is evident that the destructive energy of the steam, when a certain pressure is shown by the steam-gauge, is proportional to the quantity of water in the boiler. By the assistance of Professor Miller, of Cambridge, Messrs. Ransome, of Ipswich, and Geo. Biddell, Esq., I have been able to obtain a result which I believe to be worthy of every confidence. I will first state as the immediate result of Mr. Biddell's experiments, that when there were in the boiler of a small locomotive 22 cubic feet of water, at a pressure of 60 lbs. per square inch, and the fire was raked out, and the steam was allowed gently to escape with perfect security against priming, the quantity of water which passed off before the pressure was reduced to 0, was 2¾ cubic feet or ⅛ of the whole. In regard to the use made of Professor Miller's theory, Prof. Miller had succeeded in obtaining a numerical expression of the pressure of the steam at twelve different measures of the volume occupied by water and steam, which expression I have succeeded in integrating accurately, and I have thus obtained an accurate numerical expression of the destructive energy of the steam. In regard to the use of General Didion's experiments, these experiments give the velocity of the ball, in cannon of different sizes, produced by different charges of powder. I have found by trial which of these experiments exhibit the greatest energy per kilogramme of powder, and have adopted it in the comparison. The result was as follows:—The destructive energy of one cubic foot of water at 60 lbs. pressure per square inch, is equal to the destructive energy of two English pounds of gunpowder, in General Didion's cannon experiments. General Didion's experiments were made, as I understand, with smooth bore cannon. It cannot be doubted that much energy is lost in the windage; some also from the circumstance that the propelling power ceases at the muzzle of the gun before all the energy is expended, and some from the coolness of the metal. If we suppose that, from all causes, one-half of the energy is lost, then we have this simple result. The guage pressure being 60 lbs. per square inch, one cubic foot of water is as destructive as one pound of gunpowder. In one of Mr. Biddell's experiments, the steam-valve was opened rather suddenly, and the steam escaped instantly with a report like that of a very heavy piece of ordnance. This is not to be wondered at, for it appears from the comparison above that the effect was the same as that of firing a cannon whose charge is 44 lbs. of powder.

Mr. Wm. Fairbairn, F. R. S., said he himself had paid considerable attention to the subject of boiler explosions, and he was glad to find that Professor Airey had drawn attention to it. It was a most important subject, as about 150 persons were killed annually from boiler explosions. That was the reason they had formed an association in Manchester for the purpose of preventing boiler explosions. It had now been in operation for about eight years, and he believed there had only been one or two lives lost during that time by the explosion of boilers under the inspection of this association; whereas in other parts not under the inspection of this association, there had been two or three explosions lately. This association had done a large amount of good by preventing accidents of this kind; and he would earnestly recommend the establishment, in a district like that around Newcastle, where they had so many boilers in operation, of a similar association. He merely mentioned those facts to show that people having boilers should associate themselves for the purpose of preventing explosions, otherwise the Legislature might interfere to establish a system of inspection not so pleasant to those having boilers under their charge.

GAS IN ENGLAND.

The price of gas furnished by the Hythe and Sandgate Gas Company, is to be reduced from 8s. to 7s. per thousand cubic feet.

At Sandwich the gas consumers have held a public meeting, at which it was unanimously resolved, "That the gas now consumed [at Sandwich] is injurious to health, and destructive to the goods of many of the consumers." It was also unanimously resolved, "That the price of gas is considerably above the price charged in the neighboring towns, and the consumers are dissatisfied therewith." A committee was appointed to confer with the gas company on the subject.

At Cheltenham the price of gas has been reduced from 4s. 9d. to 4s. 6d. per thousand cubic feet. This reduction takes place from the first of this month.

The directors of the Birmingham and Staffordshire Gas Company, announce that they have decided on making a further reduction in the price of their gas, as follows: to all parties whose consumption is under 25,000 cubic feet per quarter, the price will be 3s. 4d. per thousand feet; 25,000 and under 100,000 cubic feet, 3s. per thousand; 100,000 cubic feet and upwards, 2s. 8d. per thousand. This scale is subject to a discount of five per cent. for prompt payment.

At Kineton new gas-works have been built at an expense of £1,200. The capacity of the gas-holder is 4,000 cubic feet. The price will be about 8s. per thousand.

An opposition gas company are about to build works in Stroud. The existing company charge 5s. per thousand cubic feet, and it is alleged that they make an inferior gas, about which much complaint has been made. It was proposed, at a meeting of the Board of Health of the town, held November 17th, "That it is desirable the Board should establish gas-works for lighting the town of Stroud." This resolution was put and carried unanimously. A committee, consisting of five members and the chairman, was then appointed, with powers to apply to the Secretary of State for a provisional order, and to get estimates. The works are estimated to cost £4,000, and it is expected that the price of gas will be 3s. 6d. per thousand.

At Cleethorpes, gas-works are in course of construction. Some of the inhabitants are opposed to the introduction of the works, and express their intention of adhering to lamps and candles.

A company has been formed to light the town of Great Bardfield with gas.

WATER AS A SANITARY AGENT.

General Morin, who has much occupied himself with improvements in the ventilation of public buildings, in a note addressed to the Academy of Sciences, in Paris, treats of what he terms the "hygrometricity" of confined places. Much struck with the importance which the English engineers and authors attach to the imparting to the air employed for ventilation, whether heated or not, a certain amount of moisture, he was induced to investigate whether the salubrity of such air might not be due in some measure to the development of a certain amount of electricity by the passage of the air through the vaporized water (as in the case with regard to dew and rain during storms), giving rise to the production of free oxygen. If this or some analagous modification can be shown to take place, we have in our hands a simple, efficacious, and economical means of purifying the air of inhabited places, especially in summer. Air containing free oxygen, possessing in a high degree the property of burning certain miasmata and emanations from bodies in a state of putrefaction. General Morin accordingly instituted some experiments, in order to ascertain whether the dispersion or solution of a certain quantity of sprayed water in the air sensibly modified its electrical condition. The results show the extrication of free oxygen, and the subsequent or concurrent formation of an acid. As both the oxygen and the acid, probably a nitrous compound, possess the property of destroying putrefactive emanations, their presence sufficiently proves that the vaporization of water in the air, besides the increase of moisture and depression of temperature which it gives rise to, may exert an action on the animal economy, and upon the air of habitations, deserving the attention of sanitarians.

The *Sanitary Reporter*, from which we take the above, says that the Houses of Parliament, in London, have been for some years ventilated by means of moist air, produced by a spray jet. At the end of the delivery water-pipe is affixed a movable nozzle, perforated with minute holes. The force of the water in passing through the orifices, causes the nozzle to revolve after the manner of the Catharine wheel used in fireworks, and the water is thus distributed throughout the surrounding atmosphere, producing a kind of Scotch mist.

GAS ACCIDENT IN ENGLAND.—A man named George Read was killed at the Imperial Gas-Works, Fulham, England, under the following circumstances: He was engaged with others in cleaning out one of the large holders. For this purpose it was necessary to take off the caps and let the gas escape. No sooner had they done this, than the deceased and two other men began to ascend the ladders to get out of the well in which they were at work. They had not proceeded far, however, when the gas overpowered them, and they fell to the bottom in an insensible state. The deceased was taken to St. George's Hospital, where he soon expired. A post-mortem examination revealed the fact that the man died from the joint effects of a scalp wound, and the inhalation of the gas. The coroner's jury returned a verdict of "accidental death."

GAS-LIGHT COMPANIES IN THE UNITED STATES.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

When Chartered.	Town.	State.	Chartered Capital.	Par Val. Per Sh. $	Semi-Ann'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS
1857	ADRIAN	Mich.	50,000	50	—	May & November.	4,000	3 50	....	....	
1856	AKRON	O.	20,000	33⅓	—	Do.	3,500	3 00	....	....	
1845	ALBANY	N. Y.	250,000	20	4	January & July.	65,000	3 00	120	....	None in market.
1858	ALBION	N. Y.	30,000	100	—	Do.	3,000	3 80	....	....	
1851	ALEXANDRIA	Va.	106,530	—	—	City Works.	9,000	3 50	....	....	
1852	ALLEGHANY	Pa.	200,000	25	4	May & November.	25,000	3 00	....	....	
1853	ALLENTOWN	Pa.	60,000	100	3½	Do.	5,000	3 50	....	....	
1857	ALTON	Ill.	75,000	—	—	Private Works.	4,000	3 50	....	....	
1859	ALTOONA	Pa.	40,000	20	4	January & July.	5,000	3 00	....	....	
1859	AMESBURY AND SALISBURY	Mass.	30,000	25	—	Do.	7,000	4 00	....	....	
1858	ANNAPOLIS	Md.	100,000	25	—	Do.	4,000	4 00	....	....	
1858	ANN ARBOR	Mich.	23,000	50	5	March & September.	5,500	4 00	....	....	
1858	ASTORIA	N. Y.	20,000	50	—	Do.	6,000	4 00	....	....	
1855	ATLANTA	Ga.	50,000	25	5	January & July.	12,000	5 00	....	....	
1857	ATTLEBORO'	Mass.	6,000	50	3	Do.	2,000	6 00	....	....	
1850	AUBURN	N. Y.	80,000	50	5	Do	10,000	7 00	....	....	
1851	AUGUSTA	Ga.	80,000	25	8	Do.	9,000	6 00	....	....	
1853	AUGUSTA AND HALLOWELL	Me.	184,700	50	5	Do.	10,000	4 00	....	....	
1860	AURORA	Ind.	10,000	—	—	Private Works.	3,500	3 50	....	....	{ Formerly used Sanders' Water-Gas. Recently altered to Coal Gas-Works.
1817	BALTIMORE	Md.	550,000	100	5	June & December.	150,000	2 50	150	....	None for sale.
1852	BANGOR	Me.	120,000	100	2½	January & July.	12,000	3 00	100	....	
1855	BATAVIA	N. Y.	32,000	20	4	Do.	2,500	4 00	100	100	Stock firm. Good works and well managed.
1853	BATH	Me.	65,000	100	3	April & October.	10,000	3 75	....	....	
1859	BATH	N. Y.	15,000	50	—	May & November.	3,000	7 00	....	....	
1861	BATTLE CREEK	Mich.	15,000	—	—	January & July.			....	....	
1858	BELFAST	Me.	14,000	100	—	Do.	7,000	7 00	....	....	
1856	BELLEFONT	Pa.	20,000	25	2	Do.	3,500	4 00	....	....	
	BELOIT	Wis.	30,000	—	—	Do.	4,000	4 00	....	....	
1854	BETHLEHEM	Pa.	50,000	50	4	June & December.	2,000	3 20	....	....	
1859	BEVERLY	Mass.	40,000	100	—	January & July.	4,000	4 00	....	....	
1853	BINGHAMPTON	N. Y.	50,000	50	3½	Do.	10,000	4 00	....	....	
1859	BIRMINGHAM	Pa.	40,000	50	—	Do.	4,000	4 00	....	....	
1855	BLOOMINGTON	Ill.	40,000	50	—	Do.	6,000	4 00	....	....	
1853	BORDENTOWN	N. J.	50,000	25	3	June & December.	4,000	3 80	....	....	
1822	BOSTON	Mass.	1,000,000	500	5	Do.	130,000	2 25	....	....	
1859	BRATTLEBORO'	Vt.	21,000	—	—	Do.	3,000	4 00	....	....	
1851	BRIDGEPORT	Ct.	90,000	25	4	January & July.	10,000	4 00	90	....	Passed last dividend.
1857	BRIDGETON	N. J.	50,000	20	—	Do.	5,000	4 00	....	....	
1856	BRISTOL	Pa.	30,000	25	3	February & August.	3,000	4 00	....	....	
1855	BRISTOL	R. I.	35,000	50	2	January & July.	6,000	4 00	....	....	
1859	BROCKPORT	N. Y.	25,000	100	3	Do.	1,500	4 00	....	....	
1853	BROOKLINE	Mass.	66,000	100	3½	February & August.	3,500	3 50	....	....	
1825	BROOKLYN	N. Y.	2,000,000	25	5	January & July.	75,000	2 50	170	160	
	BROWNSVILLE	Pa.				Do.			....	....	
1848	BUFFALO	N. Y.	600,000	50	5	Do.	70,000	2 90	140	125	
1852	BURLINGTON	N. J.	100,000	25	3½	Do.	5,000	4 00	105	....	
1853	BURLINGTON	Vt.	75,000	25	2½	Do.	10,000	4 50	....	....	
1859	BURLINGTON	Iowa.	65,000	50	—	Do.	8,000	4 00	....	....	
1861	CALAIS	Me.	90,000	100	—	Do.	10,000	3 50	....	....	
1852	CAMBRIDGE	Mass.	300,000	100	5	February & August.	20,000	3 50	100	97½	
1852	CAMDEN	N. J.	300,000	100	3	April & October.	15,000	3 85	105	100	
1853	CANANDAIGUA	N. Y.	50,000	50	—	January & July.	3,000	4 00	90	80	
1856	CANTON	O.	19,000	50	6	March & September.	6,000	3 00	....	....	
1853	CAPE ISLAND	N. J.	80,000	100	—	October.	10,000	6 00	....	....	{ Watering place.—These Works only run in summer.
1860	CARBONDALE	Pa.	16,000	25	—	March & September.	5,000	4 00	....	....	
1855	CARLISLE	Pa.	30,000	25	—	January & July.	4,000	4 00	....	....	
1856	CATASAUQUA	Pa.	15,000	25	5	May & November.	2,000	4 00	....	....	
1858	CATSKILL	N. Y.		—	—	Private Works.	3,000	3 00	....	....	Owned by G. T. Sutton.
1857	CHAMBERSBURG	Pa.	30,000	25	—	January & July.	3,000	4 00	....	....	
1846	CHARLESTON	S. C.	723,800	25	4	Do.	50,000	4 00	....	....	
1851	CHARLESTOWN	Mass.	200,000	50	4	Do.	30,000	3 00	105	....	
1858	CHARLOTTE	N. C.	14,000	50	10	March & September.	3,500	6 00	....	....	
1859	CHARLOTTEVILLE	Vt.	15,000	25	—	Do.	4,000	4 50	....	....	
1851	CHELSEA	Mass.	100,000	100	3½	January & July.	8,000	3 50	....	....	
1856	CHESTER	Pa.	35,000	25	3	April & October.	4,000	4 00	....	....	
1849	CHICAGO	Ill.	1,300,000	25	5	January & July.	100,000	2 50	150	140	Very scarce. Stock wanted.
1857	CHICOPEE	Mass.	50,000	20	—	Do.		4 00	....	....	
1851	CHILLICOTHE	O.	40,000	25	4	Do.	12,000	3 50	....	....	
1841	CINCINNATI	O.	1,600,000	100	5	Do.	225,000	2 50	....	....	
1859	CITIZENS', BROOKLYN	N. Y.	1,000,000	20	—	Do.	135,000	3 00	128	125	
1860	CITIZENS', READING	Mass.	99,000	100	—				....	....	
	CLARKESVILLE	Tenn.	100,000	50	—	Do.	5,000	4 00	....	....	
1860	CLAREMONT	N. H.	20,000	100	—	March & September.	3,000	4 00	....	....	
1846	CLEVELAND	O.	200,000	10	5	January & July.	20,000	3 00	....	....	
1858	CLINTON	Mass.	30,000	500	5	Do.	3,000	4 00	....	....	
1859	CLYDE	N. Y.	10,000	50	4	Do.	2,500	4 00	....	....	
1854	COHOES	N. Y.	50,000	20	3½	April & October.	5,000	3 60	....	....	{ Formerly Rosin-Gas, but now Coal. A well managed company. Stock firmly held.
1860	COLD SPRING	N. Y.	30,000	50	—	Do.	3,500	4 00	95	....	
1860	COLD WATER	Mich.	25,000	50	5	January & July.	4,000	4 00	....	....	
1852	COLUMBIA	Pa.	37,500	25	—	Do.	4,000	3 50	....	....	
1852	COLUMBIA	S. C.	44,000	25	4	Do.	6,000	6 00	....	....	
1857	COLUMBIA	Cal.	50,000	25	—	Do.	4,500	10 00	....	....	
1853	COLUMBUS	Ga.	54,000	25	5	Do.	5,000	7 00	....	....	
1850	COLUMBUS	O.	100,000	10	6	Do.	30,000	3 00	....	....	
1853	CONCORD	N. H.	50,000	50	5	Do.	8,000	3 50	....	....	
1853	COVINGTON AND NEWPORT	Ky.	100,000	50	3½	Do.	28,000	4 00	....	....	
1854	CUMBERLAND	Md.	60,000	50	3	Do.	6,000	4 00	....	....	
1857	DANBURY	Ct.	50,000	25	4	Do.	2,000	3 75	....	....	
1856	DANVILLE	Pa.	30,000	25	—	June & December.	3,000	4 00	....	....	
1855	DAVENPORT	Iowa.	56,000	100	—	Do.	6,000	5 00	....	....	
1848	DAYTON	O.	50,000	25	5	February & August.	8,000	3 50	....	....	
1853	DEDHAM	Mass.	40,000	50	—	January & July.	3,000	4 00	....	....	
1860	DELAWARE	O.	30,000	25	—	Do.	2,500	3 00	....	....	
1849	DETROIT	Mich.	500,000	50	5	Do.	30,000	3 50	160	150	Excellent Stock. No sales.
1860	DOBBS' FERRY	N. Y.	25,000	—	—	Do.	3,000	4 00	....	....	
1854	DORCHESTER	Mass.	150,000	100	—	Do.	14,000	4 00	....	....	
1859	DOVER	Del.	12,000	—	—	Private Works.	2,000	4 00	....	....	
	DOVER	N. H.				January & July.			....	....	
1857	DOYLESTOWN	Pa.	50,000	—	—	Do.	3,000	4 00	....	....	
1854	DUBUQUE	Iowa.	50,000	115	3½	Do.	17,000	4 50	....	115	This stock is wanted at par.
1853	EAST BOSTON	Mass.	133,000	25	4	Do.	20,000	3 50	....	145	
1858	EAST GREENWICH	R. I.	11,200	100	15	Do.	3,000	7 00	....	....	No transactions.
1861	EAST HAMPTON	Mass.	10,000	25	—	Do.	5,000	9 00	....	....	
1861	EAST NEW YORK	N. Y.	50,000	50	—	Do.	12,000	3 50	....	....	
1857	EASTON	Md.	9,000	10	—	Do.	1,500	7 00	....	....	
1850	EASTON	Pa.	125,000	50	4	June & December.	6,000	3 60	....	....	
1856	EASTPORT	Me.	50,000	55	—	Do.	3,000	4 00	....	....	
1855	ELIZABETH	N. J.	100,000	20	4	January & July.	14,000	3 50	....	....	
	ELLICOTT'S MILLS	Md.	10,000	—	—	Do.	4,000	4 00	....	....	
1852	ELMIRA	N. Y.	50,000	25	3½	Do.	5,000	4 00	....	....	
1852	ERIE	Pa.	68,000	50	3½	June & December.	10,000	3 00	....	....	
1853	EVANSVILLE	Ind.	60,000	50	4	January & July.	12,000	4 00	110	....	
	EXETER	N. H.	60,000	—	—	Do.	12,000		....	....	A very good Company.
	FAIR HAVEN	Ct.	20,000	25		Do.	8,000	4 00	....	....	
1847	FALL RIVER	Mass.	26,000	—	—	Private Works.	12,000	3 50	....	....	
1859	FAYETTEVILLE	N. C.	25,000	100	6	January & July.	7,000	6 00	....	....	
	FIFTH WARD (Milwaukee)	Wis.	50,000	25	—	Do.	10,000	4 00	....	....	
1857	FISHKILL	N. Y.	10,000	20	—	April & October.	1,500	2 00	....	....	
1853	FITCHBURG	Mass.	100,000	50	3	January & July.	5,000	4 00	....	....	Make Petroleum-Gas.
1859	FLEMINGTON	N. J.	20,000	—	—	Do.	3,000	4 00	....	....	
1855	FLUSHING	N. Y.	20,000	50	1½	March & September.	6,000	4 00	....	....	
1858	FOLSOM	Cal.							....	....	
	FORT WAYNE	Ind.	40,000	25	—	Do.	6,000	4 00	....	....	
1851	FRANKFORT	Ky.	50,000	—	—	City Works.	5,500	4 50	....	....	
1851	FREDERICK CITY	Md.	36,000	100	—	January & July.	5,000	6 70	....	....	
1854	FREDERICKSBURG	Va.	72,500	50	5	Do.	4,500	4 00	....	....	
1858	FREDONIA (Natural Gas)	N. Y.	10,000	100	—	Do.	2,000	4 00	....	....	Unlimited supply of Natural Gas.
1856	FREEPORT	Ill.	20,000	100	—	May & November.	10,000	4 00	....	....	

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When Chartered.	Town.	State.	Chartered Capital.	Par Val. Per Sh. $	Semi-Ann'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1859	Fremont	O.	25,000	25	—	May & November.	2,000	4 50	....	....	
1858	Fulton	N. Y.	12,000	100	—	Do.	4,000	7 00	....	....	
1855	Galena	Ill.	70,000	100	—	Do.	8,000	4 00	....	....	
1859	Galion	O.	25,000	25	—	January & July.	1,800	3 00	....	....	
1858	Galveston	Texas.	150,000	50	—	May & November.	7,000	6 00	....	....	
1854	Gardiner	Me.	100,000	50	4	Do.	8,000	4 00	....	....	
1853	Geneva	N. Y.	75,000	25	2½	Do.	6,000	4 00	....	....	
1851	Germantown	Pa.	Merged	into	the	Philadelphia Works.	12,000	2 25	....	....	
1859	Gettysburg	Pa.	20,000	50	3	January & July.	2,500	4 00	....	....	
1854	Glens's Falls	N. Y.	35,000	50	3	February & August.	4,000	4 00	....	....	
1854	Gloucester	Mass.	40,000	50	—	January & July.	5,000	3 50	....	....	
1857	Gloversville	N. Y.	15,000	25	—	Do.	3,000	3 50	....	....	
1858	Grand Rapids	Mich.	450,000	20	—	Do.	3,000	4 00	....	....	
1855	Great Barrington	Mass.	5,000	100	5	April & October.	2,000	7 00	....	....	
1849	Great Falls	N. H.	50,000	100	3	Do.	3,000	4 00	...	....	
1860	Greenfield	Mass.	20,000	50	2	January & July.	2,500	4 00	....	....	
1853	Greenpoint	N. Y.	100,000	50	5	Do.	20,000	3 00	....	....	Close corporation.
1859	Greensboro'	N. C.	12,000	50	—	April & October.	3,000	7 00	....	....	
1858	Greensburg	Pa.	30,000	25	3	May & November.	2,000	3 00	....	....	
1854	Hagerstown	Md.	15,000	20	—	January & July.	2,000	6 00	....	....	
	Hamilton	O.	15,000			Do.			....	....	
1859	Hannibal	Mo.	100,000	100	—	Do.	6,000	3 50	....	....	
1857	Harlem	N. Y.	350,000	50	3½	Do.	25,000	3 00	....	145	
1855	Harrisburg	Pa.	100,000	—	4	Do.	5,000	4 00	...	....	
1849	Hartford	Ct.	200,000	25	4	Do.	25,000	3 00	150	140	
	Hastings	N. Y.				Do.	8,000	4 00	....	....	Stock in demand.
1853	Haverhill	Mass.	50,000	50	—	Do.	5,000	4 00	....	....	
1859	Haverstraw	N. Y.	20,000	100	—	Do.	5,000	4 00	....	....	
1861	Havesville	Mass.	15,000	25		Do.	4,000	4 00	....	....	
1859	Hempstead	N. Y.	16,000	25	—	Do.	1,000	4 00	....	....	
1862	Hoboken	N. J.	100,000	25	3	Do.	30,000	2 50	....	100	
1856	Hollidaysburg	Pa.	30,000	25	2	Do.	4,000	3 50	....	....	Works not yet built.
1861	Holyoke	Mass.	20,000	25	—	Do.	3,000	4 00	....	....	
1861	Homer & Cortlandt	N. Y.	40,000	100	—	Do.	6,000	4 00	....	....	
1854	Honesdale	Pa.	30,000	25	3	Do.	2,500	4 00	....	....	
1860	Hornellsville	N. Y.	12,000	50	—	Do.	2,000	4 00	....	....	
1853	Hudson	N. Y.	50,000	100	3½	February & August.	3,000	4 00	....	....	
	Hunter's Point	N. Y.									
1857	Huntington	Pa.	18,000	50	3	Do.	2,000	3 50	....	....	
1856	Huntsville	Ala.	7,325	25	—	June & December.	2,000	5 00	....	....	
	Indianapolis	Ind.	150,000	—	—	Do.	15,000	5 00	....	....	
1857	Iowa City	Iowa.	40,000	50	—	February & August.	4,000	4 50	....	....	
1852	Ithaca	N. Y.	75,000	25	3½	January & July.	6,000	4 00	....	....	
1857	Jackson	Mich.	25,000	50	5	Do.	6,000	3 50	....	....	
	Jackson	Miss.	80,000	50	—	Do.	4,000	4 50	....	....	
	Jackson	Cal.	50,000	30	—	Do.	4,000	10 00	....	....	
	Jacksonville	Flor.	30,000	20	—	Do.	2,000	7 00	....	....	
	Jacksonville	Ind.	50,000	50	—	Do.	4,000	5 00	....	....	
1858	Jacksonville	Mo.	25,000	25	—	Do.	7,000	6 00	....	....	
1856	Jamaica	N. Y.	20,000	—	4	Do.	6,000	4 00	....	....	
1853	Jamaica Plain	Mass.	75,000	100	3½	Do.	3,000	3 50	....	....	
	Jamestown	N. Y.	25,000	—	—	Do.	4,000	4 00	....	....	
1856	Janesville	Wis.	50,000	100	—	Do.	12,000	4 00	....	....	
	Jeffersonville	Md.	30,000	25		Do.	4,000	4 00	....	....	
1853	Jersey City	N. J.	300,000	—	5	Do.	30,000	3 00	150	....	No sales since formation of Hoboken Co.
1858	Jersey Shore	Pa.	15,000	25	—	Do.	2,000	3 70	....	....	
1856	Johnstown	Pa.	80,000	25	3	Do.	8,000	3 00	....	....	
1857	Joliet	Ill.	300,000	100	—	June & December.	6,000	4 00	....	....	
1858	Kalamazoo	Mich.	30,000	50	5	Do.	10,000	4 00	....	....	
1860	Keene	N. H.	60,000	100	—	Do.	4,500	4 00	....	....	
1855	Keokuk	Iowa.	100,000	100	—	January & July.	10,000	4 50	....	....	
1855	Kingston	Pa.	50,000	50	—	Do.	3,000	4 00	....	....	
1859	Kittanning	Pa.	20,000	—	—	Doubtful.	5,000	4 00	....	....	
1854	Knoxville	Tenn.	63,000	—	—	April & October.	4,000	5 00	....	....	Said to be a fraud.
1860	Laconia	N. H.	20,000	100	—	Do.	4,000	6 00	....	....	
1859	La Crosse City	Wis.	100,000	50	—	June & December.	10,000	8 00	....	....	Petroleum and Wood Gas.
1854	Lafayette	Ind.	60,000	50	4	January & July.	10,000	3 25	....	....	
1856	Lambertville	N. J.	30,000	25	—	Do.	2,600	4 00	....	....	
1849	Lancaster	Pa.	100,000	50	4	Do.	10,000	3 00	....	....	
1856	Lancaster	O.	25,000	100	5	Do.	5,000	3 50	....	....	
1855	Lansinburg	N. Y.	25,000	100	—	Private Works.	7,000	4 00	....	....	
1849	Lawrence	Mass.	200,000	100	4	February & August.	15,000	3 50	....	....	
1859	Leavenworth	Kansas.	200,000	25	—	Private Works.	15,000	4 00	....	....	
1856	Lebanon	Pa.	26,000	50	—	February & August.	5,000	4 00	....	....	
1861	Le Roy	N. Y.	25,000	50	—	Do.	4,000	4 00	....	....	
1853	Lewisburg	Pa.	20,000	100	—	January & July.	4,000	4 00	....	...	
1852	Lewiston	Me.	100,000	100	3	Do	10,000	3 20	....	....	
1856	Lewistown	Pa,	30,000	50	3	April & October.	3,000	3 10	....	....	
1853	Lexington	Ky.	100,000	25	4	January & July.	5,000	4 00	....	....	
1853	Little Falls	N. Y.	112,000	25	—	Do.	3,500	7 00	....	....	
1861	Little Rock	Ark.	20,000	—	—	Do.	5,000	6 00	....	....	
1858	Lockhaven	Pa.	28,000	—	—	Do.	3,000	4 00	....	....	
	Lockport	N. Y.	100,000	50	—	Do.	4,000	4 00	...	....	
	Logansport	Ind.	40,000		5	April & October.	5,000	4 00	105		
1838	Louisville	Ky.	600,000	50	6	January & July.	80,000	2 50	125	....	But $481,400 stock has been sold. This Company has a large contingent fund and undivided profit on hand.
1849	Lowell	Mass.	200,000	25	5	Do.	50,000	3 25	....	....	
1852	Lynchburg	Va.	70,000	25	5	Do.	6,000	3 80	....	....	
1852	Lynn	Mass.	55,000	50	4	Do.	20,000	4 00	....	....	
1859	Lyons	N. Y.	30,000	100	—	Do.	4,000	4 00	....	....	
1852	Macon	Ga.	75,160	25	6	Do.	5,000	5 00	....	....	
1851	Madison	Ind.	160,000	25	3	Do.	10,100	3 50	....	....	
1855	Madison	Wis.	100,000	25	—	Do.	5,000	5 00	....	....	
1854	Malden & Melrose	Mass.	50,000	25	3	February & August.	5,000	4 00	....	....	
1852	Manayunk	Pa.	40,000	100	—	Do.	7,000	4 00	....	....	
1852	Manchester	N. H.	100,000	100	5	January & July.	25,000	3 00	....	....	
1830	Manhattan (N. Y. City)	N. Y.	4,000,000	50	5	Do.	600,000	2 50	....	....	
	Mansfield	O.	25,000	—	—	Do.	10,000	4 00	....	....	
1854	Marblehead	Mass.	40,000	100	3	Do.	1,000	4 00	....	....	
	Marlboro'	Mass.	20,000	—	—	Do.	8,000	4 00	....	....	
	Mauch Chunk	Pa.	50,000	50	—	Do.	7,000	4 00	....	....	
1857	Marietta	O.	50,000	50	—	Do.	7,000	4 00	....	...	Stock firm.
1860	Marion	O.	12,000	25	5	April & October.	1,500	13 55	....	....	
1858	Marysville	Cal.	50,000	100	—	January & July.	4,000	2 50	....	....	
1857	Massilon	O.	20,000	25	—	Do.	5,000	3 00	....	....	
1855	Meadville	Pa.	39,500	25	—	Do.	4,000	3 50	....	....	
	Medina	N. Y.	2,000	100	—	Do.	2,000	7 00	....	....	
1852	Memphis	Tenn.	300,000	100	5	June & December.	12,000	3 50	....	....	
	Meriden	Ct.	20,000			Do.			....	....	
1859	Metropolitan (N. Y. City)	N. Y.	1,000,000	100	—	January & July.	200,000	2 50	....	....	
1859	Middleboro'	Mass.	15,000	—	—	Private Works.		6 00	....	....	
1853	Middletown	Ct.	50,000	25	3	March & September.	5,000	3 80	....	....	Owned by G. T. Sutton.
	Middletown	N. Y.		25	—	Private Works.	3,000	3 00	....	....	
	Milford	Mass.	20,000	—	—	Do.		4 00	....	....	
	Milledgeville	Ga.	100,000	50	—	Do.		5 00	....	....	
	Milton	Pa.	10,000			Do.			....	....	
1847	Milwaukee	Wis.	400,000	50	5	January & July.	24,000	3 50	150	....	
1852	Mobile	Ala.	200,000	—	—	Do.	30,000	4 50	....	....	
1856	Monroe	Mich.	40,000	50	—	Do.	5,000	3 50	50	....	
1852	Montgomery	Ala.	100,000	25	4	February & August.	7,000	6 00	....	....	
1856	Montpelier	Vt.	30,000	25	3	January & July.	5,000	4 50	....	....	
1859	Morrisania	N. Y.	30,000	50	—	Do.		4 00	....	....	
1859	Morristown	N. J.	18,000	50	—	Do.	3,500	4 00	....	....	
1854	Mount Holly	N. J.	16,650	25	3	April & October.	2,000	7 00	....	....	
	Mount Vernon	O.	50,000	100	—	Do.		4 00	....	....	
1857	Muscatine	Iowa.	50,000	100	—	January & July.	3,000	4 50	....	....	
1854	Nantucket	Mass.	50,000	100	3	February & August.	6,000	4 00	....	....	

GAS-LIGHT COMPANIES IN THE UNITED STATES.—Continued.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

When Chartered.	Town.	State.	Chartered Capital.	Par Val. per Sh. $	Semi-Ann'l Div.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1852	NASHUA	N. H.	45,000	50	3½	January & July.	10,000	3 50	....	....	
1850	NASHVILLE	Tenn.	260,000	50	5	Do.	25,000	3 50	....	....	
1858	NATCHEZ	Miss.	46,000	50	—	Do.	20,000	5 00	....	....	
	NEVADA CITY	Cal.							....	....	
1852	NEW ALBANY	Ind.	200,000	50	3½	Do.	16,000	3 50	....	....	
1846	NEWARK	N. J.	362,000	50	5	Do.	45,000	3 62	130	....	Always a favorite stock.
1856	NEWARK	O.	30,000	100	—	Do.	7,000	5 40	....	....	
1852	NEW BEDFORD	Mass.	130,000	100	5	Do.	15,000	2 90	102	....	Well managed and kept quiet.
1859	NEWBERN	N. C.	22,000	100	6	Do.	6,000	3 50	....	....	
	NEW BRITAIN	Ct.	30,000	20	5	Do.	3,000	4 00	....	....	
1851	NEW BRUNSWICK	N. J.	100,000	20	4	Do.	8,000	3 00	115	....	
1859	NEWBURG	N. Y.	67,000	20	4	Do.	10,000	4 00	105	....	
1852	NEWBURYPORT	Mass.	150,000	10	4	Do.	9,000	4 00	92½	....	
1857	NEWCASTLE	Del.	32,300	10	3	Do.	4,000	4 00	90	....	
1847	NEW HAVEN	Ct.	250,000	25	4	Do.	30,000	3 00	155	....	None in market.
1853	NEW LONDON	Ct.	70,000	50	3	Do.	12,000	4 00	105	....	
1835	NEW ORLEANS	La.	1,500,000	100	6	Do.	120,000	4 00	180	....	
1858	NEWPORT	R. I.	130,200	100	4	Do.	10,000	3 50	112	....	
1854	NEWTON & WATERTOWN	Mass.	300,000	100	2	Do.	10,000	4 00	....	....	
	NEWTON	N. J.	30,000	—	—	Do.	3,000	4 00	....	....	
	NEWTON	Pa.	20,000	50	—	Do.	2,500	4 00	....	....	
	NEWTOWN	N. Y.									
1823	NEW YORK	N. Y.	1,000,000	50	5	May & November.	100,000	2 50	300	....	
1859	NIAGARA FALLS	N. Y.	15,000	25	—	Do.	3,000	4 00	90	....	
	NORFOLK	Va.	60,000	25	—	Do.	40,000	4 00	....	....	
1853	NORRISTOWN	Pa.	41,700	25	4	June & December.	8,000	3 50	....	....	
1855	NORTH ATTLEBORO'	Mass.	50,000	100	3½	Do.	6,000	4 00	....	....	
	NORTHERN LIBERTIES	Pa.	400,000	25	7	City Works.	40,000	2 50	....	....	
	NORTH ADAMS	Mass.	25,000	—	—	March & September.	30,000	4 00	....	....	
1856	NORTHAMPTON	Mass.	35,000	25	3	January & July.	4,500	4 00	....	....	
1859	NORTH BRIDGEWATER	Mass.	16,000	100	4	June & December.	1,000	7 00	....	....	
1856	NORWALK	Ct.	30,000	150	4	February & August.	6,000	4 00	....	....	
1859	NORWALK	O.	30,000	25	—	January & July.	4,000	4 00	....	....	
1854	NORWICH	Ct.	75,000	25	3½	Do.	12,000	3 50	....	....	
1861	NORWICH	N. Y.	12,000	50	—	Do.	2,500	4 00	....	....	
1859	NYACK	N. Y.	20,000	100	—	Do.	2,500	4 00	....	....	
1860	OBERLIN	O.	10,000	—	—	Do.	1,200	4 00	....	....	
1855	OGDENSBURG	N. Y.	75,000	50	5	Do.	9,000	4 00	....	....	
1859	ORANGE	N. J.	65,000	25	—	Do.	6,000	3 50	....	....	
1852	OSWEGO	N. Y.	81,250	100	3½	Do.	15,000	4 00	105	....	Good works, built by Hoy, Jr., & Kennedy.
1855	OTTAWA	Ill.	45,000	100	6½	Do.	6,000	4 00	....	....	
1856	OWEGO	N. Y.	40,000	50	3½	Do.	5,000	4 00	....	....	
1860	OWENSBORO'	Ky.	25,000	25	—	Do.	4,000	3 50	....	....	
1856	PADUCAH	Ky.	75,000	100	—	May & November.	4,000	5 00	....	....	
1861	PAINSVILLE	O.	40,000	25	5	Do.	2,500	5 00	....	....	
1856	PALMYRA	N. Y.	12,000	25	—	January & July.	3,000	7 00	....	....	
1847	PATERSON	N. J.	125,000	25	3	Do.	20,000	3 50	95	....	
1850	PAWTUCKET	R. I.	75,000	50	4	Do.	12,000	3 00	....	....	Surplus $10,000, May 15, 1863.
1855	PEEKSKILL	N. Y.	31,000	50	3	June & December.	4,000	4 00	....	....	Works leased to Gilbert T. Sutton.
1860	PENN YAN	N. Y.	12,000	50	5	Do.	3,000	4 00	....	....	
1859	PEOPLES', CHICAGO	Ill.	500,000	50	New	Do.	100,000	2 50	....	....	What is this Company doing?
1855	PEORIA	Ill.	100,000	50	4	Do.	8,000	3 50	....	....	
1852	PETERSBURG	Va.	120,000	—	5	January & July.	20,000	3 80	....	....	
1841	PHILADELPHIA	Pa.	3,000,000	50	—	City Works.	650,000	2 50	....	....	
1855	PIQUA	O.	50,000	50	—	January & July.	6,500	4 00	....	....	
1835	PITTSBURG	Pa.	300,000	100	5	Do.	60,000	1 50	115	....	
1854	PITTSFIELD	Mass.	50,000	100	5	Do.	4,500	4 00	....	....	
1858	PLACERVILLE	Cal.	30,000	50	—	Do.	4,500	10 00	....	....	
1860	PLAINFIELD	N. J.	25,000	50	—	Do.	2,500	4 00	....	....	
1859	PLATTSBURG	N. Y.	16,000	50	—	January & July.	5,000	7 00	....	....	
1853	PLYMOUTH	Mass.	40,000	100	—	April & October.	8,000	4 00	....	....	
1860	PORT CHESTER	N. Y.	50,000	50	—	Do.	4,000	4 00	....		
1860	PORT JERVIS	N. Y.	20,000	100	—	Do.	3,000	4 10	....	....	
1849	PORTLAND	Me.	300,000	50	4	January & July.	30,000	3 00	....	....	
1859	PORTLAND	Oreg.	50,000	50	—	Do.	3,500	8 00	....	....	
1859	PORT LAVACCA	Texas.	50,000	100	—	Do.	2,500	7 00	....	....	
1851	PORTSMOUTH	N. H.	70,000	100	8	April & October.	6,500	3 70	....	....	
1855	PORTSMOUTH	O.	50,000	50	4	January & July.	10,000	3 50	....	....	
1855	PORTSMOUTH	Va.	100,000	50	4	Do.	4,000	4 00	....	....	
1856	POTTSTOWN	Pa.	20,000	50	3	Do.	3,500	4 00	....	....	
1850	POTTSVILLE	Pa.	110,000	50	2	Do.	10,000	3 50	....	....	
1850	POUGHKEEPSIE	N. Y.	84,000	25	4	March & September.	15,000	3 50	120	110	
1848	PROVIDENCE	R. I.	1,000,000	50	4	January & July.	60,000	3 00	122	....	
1858	QUINCY	Ill.	300,000	50	4	June & December.	12,000	3 50	....	....	
	QUINCY	Mass.	00,000	00	—	Do.	00,000	0 00	....	....	
1855	RACINE	Wis.	43,500	26	—	Do.	7,000	3 50	....	....	
1857	RAHWAY	N. J.	50,000	20	—	January & July.	5,000	4 00	....	....	
1856	RALEIGH	N. C.	25,000	100	6	May & Novrmber.	5,000	6 00	....	....	
1848	READING	Pa.	100,000	25	4	January & July.	25,000	3 00	....	....	
1851	RICHMOND	Va.	341,975	—	—	City Works.	30,000	3 00	....	....	Jeff. Davis has extinguished the gas-lights of Richmond, Va.
1859	RICHMOND	Mass.	40,000	25	—	January & July.	3,000	4 00	....	....	
	RICHMOND COUNTY	N. Y.									
1859	RIPLEY	O.	25,000	50	—	April & October.	2,000	4 00	....	....	
1852	ROCHESTER	N. Y.	200,000	50	5	January & July.	50,000	2 50	....	....	
1857	ROCKFORD	Ill.	40,000	50	—	Do.	4,000	4 00	....	....	
1854	ROCK ISLAND	Ill.	100,000	50	—	Do.	6,000	4 50	....	....	
1854	ROCKLAND	Me.	50,000	100	—	Do.	6,000	4 40	....	....	
1852	ROME	N. Y.	85,000	100	3½	Do.	10,000	3 60	....	....	
1854	RONDOUT and KINGSTON	N. Y.	65,150	20	3½	June & December.	10,000	3 80	....	....	
1854	ROXBURY	Mass.	150,000	100	5	January & July.	20,000	3 50	....	....	
1859	RUTLAND	Vt.	20,000	25	—	Do.	4,000	3 50	....	....	
	SACO	Me.	71,600	100	3½	April & October.	8,000	4 00	....	....	
1857	SACRAMENTO	Cal.	500,000	100	—	Do.	40,000	10 00	....	....	
1859	SAG HARBOR	N. Y.	20,000	—	—	Do.	4,000	4 00	....	....	
1858	SAINT ALBANS	Vt.	15,000	20	—	Do.	3,000	7 00	....	....	
	SAINT JOHNSBURY	Vt.	30,000	25	—	Do.	4,000	4 00	....	....	
1857	SAINT JOSEPH	Mo.	50,000	100	5	January & July.	6,000	5 00	....	....	
1859	SAINT LOUIS	Mo.	600,000	50	—	June & December.	180,000	3 50	....	....	
1857	SAINT PAUL	Min.	200,000	50	3	January & July.	10,000	6 00	....	....	Surplus $10,000, May 15, 1863.
1856	SALEM	N. J.	30,000	25	3	Do.	5,000	3 86	....	....	
1850	SALEM	Mass.	200,000	100	4	February & August.	30,000	3 24	....	....	
1859	SALEM	O.	25,000	20	—	Do.	3,000	3 00	....	....	
1859	SALISBURY	N. C.	14,600	50	6	May & November.	2,500	6 00	....	....	
	SALISBURY MILLS	Mass.	1,250	25	—	Do.	3,000	4 00	....	....	
	SALMON FALLS	Me.	25,000	100	—	Do.	3,000	4 00	....	....	
	SAN ANTONIO	Texas.	75,000	20	—	Do.	40,000	6 00	....	....	
1854	SANDUSKY	O.	75,000	50	—	April & October.	9,000	3 00	....	....	
1859	SANDWICH	Mass.	10,000	—	—	Private Works.	2,000	3 50	....	....	
1852	SAN FRANCISCO	Cal.	2,000,000	100	4½	Do.	100,000	6 50	100	....	
	SAN JOSE	Cal.							....	....	
1858	SARATOGA SPRINGS	N. Y.	30,000	100	—	January & July.	6,000	3 60	70	....	
	SAUGERTIES	N. Y.	30,000	20	—	Do.	4,000	3 00	....	....	
1849	SAVANNAH	Ga.	200,000	25	5	Do.	10,000	3 75	....	....	
1851	SCHENECTADY	N. Y.	50,000	—	—	Private Works.	11,000	4 00	....	....	
1858	SCRANTON, Gas and Water	Pa.	100,000	25	—	January & July.	6,000	3 80	....	....	About trying Water-Gas.
1857	SELMA	Ala.	20,000	100	—	Do.	2,000	5 00	....	....	
1856	SENECA FALLS AND WATERLOO	N. Y.	80,000	50	3	Do.	10,000	4 00	100	....	
	SHREVEPORT	La.	40,000	25	—	Do.	3,000	0 50	....	....	
1856	SING SING	N. Y.	40,000	100	—	Do.	3,000	3 50	....	....	
	SMYRNA	Del.						4 00	....	....	Petroleum Gas.
1860	SOUTH ADAMS	Mass.	10,000	25	—	Do.	3,000	4 00	....	....	
1859	SOUTH BRIDGE	Mass.	5,000	25	—	Do.	4,010	6 00	....	....	
	SOUTH BOSTON	Mass.	200,000	50	—	Do.	60,000	3 25	110	....	
	SPRINGFIELD	O.	200,000	100	—	Do	20,000	3 50	....	....	
1854	SPRINGFIELD	Ill.	75,000	50	—	January & July.	10,000	3 50	....	....	
1848	SPRINGFIELD	Mass.	100,000	500	5	February & August.	10,000	3 60	140	....	
1858	STAMFORD	Ct.	6,250	25	5	April & October.	3,000	3 50	....	....	
1857	STATEN ISLAND	N. Y.	150,000	50	5	January & July.	26,000	4 00	95	....	

GAS-LIGHT COMPANIES IN THE UNITED STATES.—Continued.

Compiled from official sources expressly for the AMERICAN GAS-LIGHT JOURNAL.

CORRECTED BY JOHN B. MURRAY, No. 39 NASSAU STREET, NEW YORK, DEALER IN GAS-LIGHT SHARES.

When Chartered.	Town.	State.	Chartered Capital.	Par Val. per Sh. $	Semi-Ann'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1859	Staunton	Va.	18,000	50	6	January & July.	4,000	7 00	....	....	
	Steubenville	O.	150,000	100	—	Do.	15,000	4 00	....	....	
	Stockton	Cal.	50,000	—	—	Do.	8,000	10 00	....	....	
1848	Syracuse	N. Y.	125,000	25	5	March & September.	25,000	3 00	112	....	
	Tamaqua	Pa.	40,000	25	—	Do.	3,000	4 00	....	....	
1859	Tarrytown and Irvington	N. Y.	70,000	50	—	January & July.	3,000	4 00	....	....	
1853	Taunton	Mass.	100,000	50	4	Do.	10,000	4 00	....	....	
	Terre Haute	Ind.	100,000	100	—	Do.	3,000	4 00	....	....	
	Thompsonville	Ct.	25,000	50	—	Do.	4,000	4 50	....	....	
	Tiffin	O.	25,000	20	—	Do.	4,000	4 00	....	....	
1853	Toledo	O.	100,000	50	3	Do.	8,000	3 50	....	....	
1847	Trenton	N. J.	100,000	20	4	Do.	15,000	3 42	....	110	
1848	Troy	N. Y.	200,000	100	4	June & December.	35,000	3 00	160	....	
1856	Urbana	O.	30,000	25	—	April & October.	3,500	4 00	....	....	
1849	Utica	N. Y.	80,000	100	4	Do.	22,000	3 60	....	....	
1853	Vicksburg	Miss.	66,000	50	—	March & September.	4,000	4 50	....	....	
1859	Vincennes	Ind.	25,000	100	—	January & July.	2,000	4 00	....	....	
1863	Virginia City	N. T.					20,000				
1858	Walden	N. Y.	2,500	—	—	Private Works.	1,000	6 00	....	....	
1853	Waltham	Mass.	100,000	100	4	January & July.	3,000	4 00	....	....	
1857	Ware	Mass.	30,000	20	—	Do.	3,500	4 00	....	....	
1861	Warren	O.	30,000	50	—	Do.	4,000	3 00	....	....	
1854	Warren	R. I.	20,000	25	—	Do.	3,000	4 00	....	....	
1855	Washington	D. C.	500,000	20	5	Do.	50,000	2 61	150	148	
1859	Washington	N. C.	15,000	100	—	April & October.	1,500	6 00	....	....	
1848	Washington	Pa.	20,000	25	4	January & July.	4,000	3 00	....	....	
1854	Waterbury	Ct.	100,000	25	—	Do.	4,000	4 00	....	....	
1852	Waterford	N. Y.	12,000	25	—	Do.	4,000	4 00	....	....	
1852	Watertown	N. Y.	20,000	100	—	Do.	10,000	7 00	....	....	
1856	Watertown	Wis.	25,000	100	—	Do.	5,000	5 00	....	....	
1858	Wautoma	Wis.	30,000	50	—	Do.	3,000	4 50	....	....	
1857	Waverly	Miss.	20,000	100	—	April & October.	4,000	5 00	....	....	
1854	West Cambridge	Mass.	60,000	100	—	February & August.	10,000	4 00	....	....	
1852	Westchester	Pa.	100,000	25	2½	Do.	8,500	3 50	....	....	
	Westfield	Mass.	25,000	100	6	Do.	4,000	4 00	....	....	
	Weston	O.	20,000	25	—	Do.		5 00	....	....	
1837	West Point	N. Y.	50,000	—	—	United States Military	Academy.	2 00	....	....	
1853	West Troy	N. Y.	100,000	50	3	January & July.	10,000	3 60	85	....	
1850	Wheeling	Va.	75,000	25	6	Do.	12,000	2 70	....	....	
	White Plains	N. Y.	20,000	20	—	Do.			....	....	
1856	Wilkesbarre	Pa.	50,000	50	—	May & November.	4,000	3 33	100	80	
1850	Williamsburg	N. Y.	1,000,000	50	5	January & July.	60,000	3 00	....	....	
1858	Williamsburg	Va.	30,000	25	—	Do.	3,000	4 00	....	....	Camp-fires of the Union Army light up this place at present.
1857	Williamsport	Pa.	70,000	25	4	Do.	3,500	3 80	....	....	
1859	Willimantic	Ct.	12,000	—	—	Do.	2,500	3 50	....	....	
1853	Wilmington	N. C.	60,000	50	5	Do.	8,000	5 00	....	....	
1852	Wilmington	Del.	200,000	50	5	February & August.	20,000	3 00	....	....	
1854	Winchester	Va.	36,000	50	6	January & July.	5,000	4 00	....	....	
1861	Windsor	Vt.	20,000	25		Do.	2,000	6 00			Make Petroleum Gas.
	Woburn	Mass.	20,000	—	—	Do.	3,000	4 00	....	....	
1856	Woodstock	Vt.	10,000	50	4	Do.	4,000	6 00	....	....	
1853	Woonsocket	R. I.	82,600	100	4	April & October.	4,000	3 50	....	....	
1856	Wooster	O.	25,000	50	—	January & July.	6,000	3 00	....	....	
1849	Worcester	Mass.	160,000	100	5	Do.	15,000	3 50	....	....	
1855	Xenia	O.	40,000	50	—	Do.	3,000	4 00	....	....	
1854	Yonkers	N. Y.	75,000	50	3½	Do.	6,500	4 00	102½	....	
1849	York	Pa.	40,000	57	3	June & December.	10,000	3 50	....	....	
	Yorkville	S. C.	20,000	25	—	Do.	4,000	4 00	....	....	
1858	Ypsilanti	Mich.	20,000	50	5	February & August	6,000	14 00	....	....	
1850	Yreka	Cal.	30,000	100	—	Do.	2,000	0 00	....	....	
1848	Zanesville	O.	44,600	25	4	Do.	10,000	3 00	....	....	

GAS-LIGHT COMPANIES IN THE BRITISH PROVINCES OF NORTH AMERICA.

When Chartered.	Town.	Province	Chartered Capital.	Par Val. per Sh. $	Semi-An'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
1854	Belleville	C. W.	33,040	100	4	January & July.	1,200	5 00	....	....	
1854	Brantford	C. W.	32,000	100	2¼	Do.			....	....	
	Brockville	C. W.	50,000	—	—	Do.	5,000	4 00	....	....	
	Chatham	N. B.	50,000	—	—				....	....	
1854	Charlotte Town	P. E. I.	50,000	100	5	Do.	3,000	3 50	....	....	
1857	Cobourg	C. W.	30,000	—	—	February & August.	4,000		....	....	
	Dundas	C. W.	30,000	—	—	Do.	6,000	4 00	....	....	
	Frederick	N. B.	50,000	—	—	Do.			....	....	
1843	Halifax	N. S.	160,000	20	7	May.	30,000	3 00	....	....	
1850	Hamilton	C. W.	125,000	40	5	March & September.	20,000	3 50	....	....	
1848	Kingston	C. W.	80,000	100	—	Do.	6,000	3 50	....	....	
1853	London	C. W.	100,000	20	5	May & November.	5,000	5 00	....	....	
1847	Montreal	C. E.	400,000	40	—	March & September.	110,000	2 50	....	113	Last sale at this figure.
1854	Ottawa	C. W.	40,000	40	5	Do.	5,000	4 50	....	....	
1859	Point Levi	C. E.	25,000	25	—	January & July.	4,000	3 50	....	....	
1859	Port Hope	C. W.	28,000	20	4	May & November.	4,500	3 50	....	....	
1847	Quebec	C. E.	200,000	200	4	January & July.	60,000	3 00	....	....	
1848	Saint Catherine's	C. W.	80,000	20	—	May & November.	7,000	4 50	....	....	
1859	Saint Hyacinthe	C. E.	15,000	20	—	Do.	4,000	4 00	....	....	
	Saint John	N. B.	170,000	85	4	June & December.	25,000	3 00	110	110	Sales at this figure.
	Saint John's	N. F.	50,000	—	4	Do.	30,000		....	....	
1858	Sorel	C. E.	14,000	20	4	Do.	4,000	3 00	....	....	
1848	Toronto	C. W.	400,000	50	—		50,000	3 00	....	....	This Co. pay a quarterly div. of 2 per ct.

GAS-LIGHT COMPANIES IN CUBA, MEXICO, SOUTH AMERICA AND NEW ZEALAND.

When Chartered.	Town.	State.	Chartered Capital.	Par Val. per Sh. $	Semi-An'l Div'd.	Dividends Payable.	Population of Gas District.	Price per 1000 Feet.	Asked pr. cent.	Offered pr. cent.	REMARKS.
	Callao	Chile.		—	—	January & July.	20,000	7 00	....	....	
	Cardenas	Cuba.	50,000	—	—	Do.	180,000	5 00	....	....	
1857	Compania Cubana	Hav'a.	500,000	500	10	Do.			....	....	
	Cienfugos	Cuba.		—	—	Do.	12,000	5 00	....	....	These four towns are lighted by the Compania Cubana of Havana.
	Guanabacoa	Cuba.		—	—	Do.	14,000	5 50	....	....	
	Regla	Cuba.		—	—	Do.	10,000	5 00	....	....	
	Trinidad	Cuba.		—	—	Do.	16,000	5 00	....	....	
	Guines	Cuba.		—	—	Do.			....	....	
	Guyaquil	S. A.	150,000	—	—	Do.	35,000		....	....	
	Havana	Cuba.	2,000,000	500	—	Quarterly.	200,000	5 60	....	175	
	Lima	Peru.	100,000	—	—	January & July.	150,000		....	....	
	Maranham (Chartered)			—	—	Do.			....	....	
	Matanzas	Cuba.	50,000	—	—	Do.	180,000	8 50	....	....	
	Mexico City	Mex.	550,000	—	—	Do.			....	....	
	Montevideo	S. A.	500,000	—	—	Do.			....	....	
	Para (Chartered)			—	—	Do.			....	....	
18 4	Rio de Janeiro	S. A.	1,000,000	500	7½	Do.	800,000	4 00	....	....	
	San Iago	Chile.	500,000	—	—	Do.	180,000	7 00	....	....	
1857	Saint Jago de Cuba	Cuba.	450,000	500	—	Do.	25,000	5 00	....	....	
	Valparaiso	Chile.	500,000	—	—	Do.	65,000	6 00	....	....	
	Vera Cruz	Mex	500,000	—	—	Do.			....	....	
	Ville Clara	Cuba.	50,000	—	—	Do.			....	....	
	Auckland	N. Z.		—	—	Do.			....	....	

WATER SUPPLY OF LONDON.

A correspondent of the London *Builder*, signing himself "Anti-Monopoly," gives the following interesting particulars respecting the water supply of that metropolis:

Finding the question of the water-supply to the Metropolis again occupying attention, I hand you some details that may interest your readers.

Although the supply was calculated at 10,140,500 cubic feet per day, or at the rate of 30 gallons per head per day of the population, yet it was notorious that there were in London 70,000 houses, occupied by more than half a million persons, that had no supply whatever.

The 30 gallons per day to each individual were thus shown to be practically a fallacy. Yet, were it true, certain essentials would still be lacking.

The metropolis wants water, but good water, sweet and wholesome, not diluted mud and sewer refuse; as it is notorious that on all the tributaries of the Thames the cottage privies stand over the streams; the hog-styes and dunghills drain into them; the Thames itself, in its course of 160 miles, receives the refuse outpourings of 223 cities, towns and villages; to say nothing of the various paper-mills, iron-works, gas-works, and other objectionable places that discharge their refuse into the Thames and its tributaries. I also consider the manner of distributing the water-supply of London objectionable. I believe the water companies insist upon *leaden* pipes being used, which must seriously contaminate the water in passing through them; indeed, in the sytem of an intermittent supply, in some cases the water must stand for days in the leaden pipes.

Then there are the cisterns, an indispensable arrangement to an intermittent supply. Any sort are highly objectionable, as their situation prevents their being frequently examined or cleaned, and they are generally receptacles for rubbish and filth; and if out of doors, in summer-time, you have your water luke-warm out of them, and sometimes a rapid aquatic vegetation occurs.

Analysis of water engaged the attention of the great chemist, Berzelius, during some of the latter years of his life. He found it impossible to divest water, once contaminated by human excreta, of its noxious principles.

The mischief of all impure water is what is in solution: the impurities in suspension can be mechanically arrested, and that is all the filtering beds of the water companies can effect; but they do not do all that can be done by them even in that matter.

The inhabitants of London require a soft, as well as a pure water; for it was calculated twelve years ago that 12,000 tons of soap per year were used, which, at £50 per ton, amounted to £600,000; whereas, had the water been soft, 3,800 tons would have sufficed, which, at the rate of £50 per ton, would have only amounted to £190,000; or, in other words, 100 gallons of London water required 30 lbs. of soap to make a sufficient lather, and the same result was obtained with 100 gallons of softer water with 9½ lbs., which is about 200 per cent. in excess.

Since the reports of the Health of Towns Commissions, a few years back, many schemes have been put forward with a view to a pure and efficient water-supply to the metropolis. Artesian wells, distant lakes, and streams were spoken of as available sources; but of course the water companies' influence raised objections against every plan as unfeasible.

Forcible objections must be urged against increasing the already too numerous associations of irresponsible companies. One great controlling administrative authority appears to be the essential principle of true sanitary reform.

In some towns, where the water-works belong to the local Board of Health, they wash down the footways, streets, courts, alleys, and even the fronts of the houses where requested to do so. What a boon such an arrangement would be to the narrow alleys and close courts of the metropolis. I find it is calculated to require one gallon of water to wash one superficial yard of a paved court, alley, footway, or street.

In dry hot weather, it is the practice of some local boards of health to flush their street gullies and sewers, which is a very excellent plan; but it is almost out of the question in the metropolitan district, although very necessary, as a district surveyor informs me 10s. per hour is the price charged by the water companies for drawing a fire-plug to let the water run for that purpose.

I am of opinion that the present water supply of the metropolis is as deficient in quantity (to the sanitary requirements) as in quality. And, with all our advances in engineering and sanitary science, it must be admitted that the water supply to the metropolis is miserably deficient; in fact, it is a disgrace not only to London, but to England. Why not, by some means, raise the two millions and a half of capital that the eight companies are supposed to represent, and take the monopoly out of their hands.

I consider most of the cities in England, many in Europe and North America, far better supplied than London is with water; and the water companies being irresponsible, their servants consider they have a right to act as they think fit; they tear up roads and footways at most inconvenient times and positions, and they lay in their water-pipes so shallow that a sharp frost stops the supply even in the main pipes, which is a serious oversight, and plainly shows they do not pay sufficient attention to the practical part of their business. I will not assume them to be so penurious as to assert that it is done to save expense to the company, to the serious inconvenience of the consumers at such times, as many can recollect that during the last severe frost no water ran through the pipes for several weeks.

I hand you a few memoranda of the different water-supplies in England, Europe, and North America.

LONDON WATER COMPANIES IN 1850.

	Supplied in million galls. per year.	Galls. per house pr. day	At a cost to company per million galls. £	s.	d.	Degree of impurities per gall. in 1863.
New River	5,278	174	9	17	4	17.76
East London	2,956	143	6	7	7½	21.08
Southwark*	1,820	143	5	9	4	18.80
West Middlesex*	1,109	124	16	9	7	14.24
Lambeth*	913	107	15	0	6½	18.36
Chelsea*	1,304	170	19	10	4½	16.44
Grand Junction*	1,127	220	9	14	6½	17.48
Kent	323	98	17	2	10½	25.88
Hampstead	146	89	22	5	7½	

The total supply by all the nine companies for street watering, flushing sewers, and fires, was estimated at 16,748 millions of gallons per year at this date, 1850.

There are many other cities and towns in England that are well supplied with water, of which I have no memoranda; but I am convinced that London is very far behind them in the water supply.

The Roman water-works were splendid, and ought to shame modern Europe:

Aqueducts.	Length.	Galls. in 24 hours.
Appian, 312 B. C.	10 miles	27,724,181
Old Anio, 275 B. C.	36½ do.	66,813,887
Maician, 146 B. C.	57 do.	74,249,917
Fepulan, 127 B. C.	14½ do.	6,760,386
Julian, 35 B. C.		18,321,407
Virgin, 22 B. C.	14 do.	38,040,467
Alsietina, 14 A. D.	20 do.	5,625,016
Claudia, 49 A. D.	42 do.	96,988,991
New Anio, 90 A. D.	54 do.	71,979,127
Total		376,884,379

Some auxiliary feeders made the total length of aqueduct at the period to exceed 255 miles in length. The Pont du Gard aqueduct, 30 miles in length, was in use for centuries; and, after the lapse of fourteen centuries, so excellent was the construction, that it could be restored without considerable outlay.

The Versailles aqueduct is 98 miles, and out of it there are 13 miles of tunnel; the Versailles and Marli aqueduct, is 4,400 feet long and 200 feet high.

Iron pipes are much inferior to masonry for the conveyance of large quanlities of water, to say nothing of the danger and inconvenience in case of bursting.

The Croton aqueduct and water supply to New York are a grand piece of engineering, 40½ miles in length; the cross section, 53.34 feet in area, capable of conveying thirty million gallons per day. There are also above 180 miles of pipes, varying from 36 inches to four inches in diameter, laid through the city to distribute the water supply; the receiving reservoir is about 35 acres, and usually holds about 150 million gallons. The distributing reservoir is about four acres, and holds about twenty million gallons. Cost of the water-works, 8,575,000 dollars; cost of the distributing pipes, 1,800,000 dollars.

The Fairmount water-works supply the city of Philadelphia through 97 miles of iron pipes. The daily consumption, in 1848, was 4,275,352 gallons; 2,418,016 gallons was the supply to London (see table). Boston has also an aqueduct supply, but of those works I have no information, although my relatives resided there for many years.

There is plenty of water which could be stored to supply London by gravitation. I am decidedly opposed to pumping by steam-power. The ancients supplied Rome by gravitation, and that is the proper way to supply London. Any of your readers that may be interested in this matter will find some valuable information in several Government blue books.

ANTI-MONOPOLY.

SUPPLY OF PUBLIC LAMPS BY METER.

The continued misrepresentations made by the *Journal of Gas Lighting* respecting the proceedings at Reading are really unworthy of any respectable journal. When such misstatements systematically appear in a journal to which certain classes look for accurate information, they can only be attributed to one of two causes, either that the editor has been made the innocent victim of some unscrupulous correspondent, or that the statements are fabricated by those who conduct the journal. Now, on several former occasions, we have shown the utter untruthfulness of the statements which have been made with reference to the meter system at Reading, and have published the indignant denial of the officials as to the pretended abandonment of the meter system. We apprehend, therefore, that the conductors of the Journal, knowing thereby how much they had been deceived by former information from Reading, would be cautious in repeating any such doubtful intelligence, and we are, therefore, almost forced to the conclusion that the more recent misstatements are mere fabrications designed for the purpose of influencing other towns to be content with the present rough-and-ready system of having the gas doled out for their public lights. If this be the policy of the Journal which professes to represent the interests of the gas companies, we leave it without comment to that measure of contempt which it will doubtless receive alike from friends and foes.

We wish to recall to the recollection of our readers who peruse the *Journal of Gas Lighting*, and to inform those who do not take the trouble to read it, that the Journal has recently once more asserted that the meter system has been abandoned in Reading, that the indications of the meters have been disregarded in the arrangement between the Board and the Gas Company, and that an agreement has been entered into, whereby the Board is to pay at the rate of four feet an hour for the gas supplied by the Company.

Knowing how completely at variance all these statements were with the real facts of the case, we have ourselves written to the official best informed as to all that has taken place, namely, to Mr. Rogers, solicitor, of Reading, and Clerk to the Local Board of Health. To the energy and zeal of this gentleman the Local Board and the public of Reading are chiefly indebted for the great saving effected by the introduction of meters for the public lamps, and also for many other useful provisions introduced into the Act of the Reading Companies, when they were before Parliament for their Amalgamation Bill. We have now the pleasure of laying before our readers the reply of Mr. Rogers, together with the last report of the Public Lights and Gas Committee, presented to the Local Board on the 5th November, 1863.

It will be unnecessary to point out that this letter and report completely contradict, from beginning to end, every one of the absurd statements which have recently appeared on the subject in the *Journal of Gas Lighting*.

In the first place, the meter system has not been abandoned, and the Board is only waiting until the works of the Company shall be in order, and something like an uniform pressure given, in order to put the meters again in action.

Secondly, in arranging the accounts of gas to be paid for, the meter indications have not been disregarded, but have been strictly followed, as the detailed statement of the committee clearly shows.

Thirdly, instead of an agreement to consume four

feet an hour whilst the meters are temporarily out of action, the agreement is to consume three feet an hour, which, in consequence of inadequate pressure in October, has been further reduced to two feet an hour.

What shall be said of the *Journal of Gas Lighting* after this *exposé?* Will any local authority, or any officer of any local authority, in the kingdom, be induced to believe his statements in future? We earnestly hope that all the local authorities who are now considering the question of burning by meter, will seek for any information in which our columns may be deficient, by actual application to Reading itself, or to the officers of its Local Board. We advised this on a former occasion, and have reason to know that the advice has not been thrown away.

As the results of the meter system have now been definitely ascertained and agreed upon during a fixed period, we think it right to place the following analysis before our readers, and we therefore present them with a table showing the saving effected by the meter system at Reading:

PERIOD.	Hours fr. sunset to sunrise.	Quantity at 4 feet an hour.	Quantity at 5 feet an hour.	Quantity to be paid for by meter indication.	Saving as compared with four feet an hour.	Saving as compared with five feet an hour.
21st May to	H. M.					
1st July...	313 40	1,255	1,568	940	315	628
Mth of July.	216 48	987	1,234	243	744	991
" Aug.	294 21	1,177	1,471	369	808	1,102
" Sept.	342 11	1,369	1,711	432	937	1,279
	1,197 00	4,788	5,984	1,984	2,804	4,000

Thus the saving by the meter system, as compared with 4 feet an hour, has been 2,804 feet per lamp in 3½ months of the year, and the saving as compared with 5 feet an hour is actually 4,000 feet per lamp.

The results of the meter system may be summed up under the following heads:

1. The consumption by meter during 1,197 hours of darkness has been 1,984 feet per lamp, which is equal to 1.66 foot an hour.

2. Calculated at the same rate for the whole year, the consumption would be under 7,000 feet per annum as against 17,232, the consumption at 4 feet an hour, or against 21,540 feet, the consumption at 5 feet an hour.

3. The lamps at Reading, in 3½ months, have actually burnt 882 hours, the number of dark hours between sunset and sunrise having been 1,197, the saving being chiefly due to the lighting and extinguishing being under the control of the local board.

4. The actual consumption of gas as registered by the meters, and agreed to by the company during these 882 hours, has been 1,984 cubic feet, or at the rate of 2¼ feet an hour.

5. As the gas for public lamps is paid for at Reading by Act of Parliament at 3s. 7d. per 1,000 feet, the actual money saving on each lamp in gas alone will amount, according to the experience of the meters, to 36s. 8d. per annum when compared with 4 feet an hour, and to 52s. 1d. per annum when compared with 5 feet an hour throughout the year.

6. In addition to this great saving in the cost of the gas for public lighting, the Local Board at Reading saves at least 5s. per lamp per annum by employing their own lamplighters instead of allowing this service to be done by the Gas Company.

What has been done at Reading may be done everywhere else, and it is only apathy or ignorance which prevents the same improvements being made in every town throughout Great Britain, not excepting the metropolis.

To the Editor of the Sanitary Reporter:

DEAR SIR,—I have received your note with the extract from the *Journal of Gas Lighting*, of November 17th, respecting our public lamps and the meter registrations. I am sorry that any journel should publish statements so opposite to the truth as are contained in this extract; but in order to show you exactly how the matter stands, I have enclosed you a copy of a report from the Public Lights and Gas Committee, presented to the Reading Local Board on the 5th inst., which sets out fully the arrangement with the company, from which you will see that it was wholly based on the registration of the meters, and that the use of the meters is at present suspended *solely* on account of the alterations which are being made in the company's works. You will see that during the interval the board is not to pay at a greater rate than 3 feet per hour—a result which is entirely owing to the introduction of the meter system, and to which we consider we are greatly indebted. It is undoubtedly the safe and prudent course for public bodies to adopt in their dealings with gas companies.

You are at liberty to publish the report which I enclose, and this letter also if you please. I am, dear sir, yours faithfully, THOMAS ROGERS,

Clerk to the Reading Local Board of Health.

REPORT FROM THE READING PUBLIC LIGHTS AND GAS COMMITTEE.

Presented to the Local Board of Health on Thursday, the 5th day of November, 1863.

LIGHTING OF WINTER LAMPS.

1. Your committee, in their last report, informed your board that they had arranged that the whole number of lamps should be lighted on and after the 1st October during the winter months, and that your committee intended to re-adjust the whole lamps before the 1st of October to an uniform standard of light suitable to the winter months. On examining, however, the sheets of the pressure gauges it was ascertained that an irregular and low pressure existed in the company's mains; and as the company, on a formal application from your clerk, admitted that in the then state of their works they could not guarantee to maintain any fixed or regular pressure, it was obvious that the adjustment of the public lights to an uniform standard was impossible, and that all attempt at this must be delayed until the company's works were placed in a satisfactory condition. It was, therefore, arranged between the company and your committee that no registration of the meters should be attempted during the month of October, but that the public lamps should be lighted so as to secure, as nearly as practicable, a regular consumption of gas at the rate of three feet per lamp per hour. The result of this arrangement will be referred to in a subsequent part of this Report.

REGISTRATION OF METERS—ADJUSTMENT OF ACCOUNTS WITH GAS COMPANY.

2. In their last Report your committee informed your board that the registrations of the meters during the month of August had been directed to be taken on the 1st of September. This was accordingly done; and on the 1st of October the registrations for the month of September were also taken. Your committee having thus obtained the registrations of the meters for the whole period during which they had been in operation, felt it their duty, as was stated in their last Report to be their intention, carefully to examine the registrations; in order, on the one hand, that they might arrive at a clear conclusion as to the actual working of the meter system, and, on the other hand, to place themselves in a position to adjust, on a satisfactory footing, the claim of the company for gas consumed during the period referred to. Your committee are relieved from the necessity of entering into any detailed statement on either of these points in their present Report, as they have the pleasure of informing your board that the clerk has succeeded in arranging with the chairman of the gas company all questions between your board and the company respecting the consumption of gas for the whole period during which the meters have been in operation in a manner and upon terms entirely satisfactory to your committee, and which are, therefore, now presented to your board for approval. Under such circumstances your committee feel that one or two explanatory observations only are required. The board should, in the first place, be reminded that the meter system commenced on the 21st May last upon an adjustment of the lights which was continued at the same standard up to the 30th June, and that a second re-adjustment of the lights took place in the beginning of July, which was continued in the same state down to the 30th September. During the earlier of these periods, not only was the adjustment of the lights made at a higher standard than in the latter period, but the pressure sheets showed that the pressure was maintained in the company's main at a considerably higher standard also; whilst, during the latter three months, the re-adjustment was not only made to a somewhat lower standard, but the pressure in the company's mains was continually decreasing; so that in the month of September the night pressure had diminished down to 8-64 tenths from 12 tenths, which appears from the pressure registers to have been maintained up to the 15th of June. These circumstances are mentioned in order that the general outline of the actual facts may be before the board, and that the board may be able, in some degree, to account for the largely diminished consumption of the latter months. Your committee only deem it necessary further to add, that the arrangement which they have made with the company for payment during the meter period, viz., from May 21st to 30th of September, is as follows:

1. From May 21st to 30th June, it has been agreed that the quantity of gas consumed shall be taken at 940 feet per lamp, which period, comprising 272 hours of lighting, would be at the rate of about 3½ feet per hour. The average consumption calculated upon the registration of the whole 35 meters in use during that period, would have been 925 feet per lamp, so that it will be seen the trifling addition of feet per lamp for the whole period has been made in accordance to the above arrangement.

2. For the month of July, the quantity of gas consumed has been agreed to be taken at 243 feet per lamp (ascertained by the consumption of 12 meters agreed to between your clerk and the chairman of the company), which period, comprising 111 hours of lighting, would be at the rate of about 2¼ feet per hour.

3. For the month of August the quantity of gas consumed has been agreed to be taken at 369 feet per lamp (ascertained by the consumption of the same 12 meters), which period, comprising 211½ hours of lighting, would be at the rate of about 1¾ feet per hour.

4. For the month of September the quantity of gas consumed has been agreed to be taken at 432 feet per lamp (ascertained by the consumption of the same 12 meters), which period, comprising 287½ hours, would be at the rate of about 1½ feet per hour.

It only remains to observe on this subject, that with reference to the month of October, during which period it was agreed, as before stated, that the registrations of the meters should not be taken, in consequence of the company being unable to guarantee any regular pressure in their mains, the company have very fairly admitted that the proposed standard of an estimated consumption of three feet an hour has not been maintained owing to the condition of the company's works, and the company have, therefore, agreed, through their chairman, to accept a proposal made by your committee, that the payment for gas by your board during the month of October shall be at the rate of two feet per hour only.

Your committee have great satisfaction in being able thus to report the final adjustment of all questions between the company and your board up to the present time, and they indulge a sanguine hope that when the improved works of the company are fully in operation, it will be found that the new system will not only be attended with much practical benefit to the town, but will be worked with increased facility and comfort to all, whether on the part of the company or your board who may be engaged in administering it.—*Sanitary Reporter.*

A NEW MODE OF LIGHTING CITIES.—The London *Builder* says, that some one suggests an economical way of lighting cities, and proposes to apply it to Paris. Balloons, from the cars of which are to emanate an electric light, are to be fixed at certain stations, and hover over the city, at the proportion of one balloon to 50,000 persons. It is suggested by the *Builder* that a windy day might very materially interfere with the stability of the balloons.

ANOTHER PATENT LIGHT.—Messrs. Wells and Myers, of Manchester, England, have patented a new "permanent light," which is thus described: "The light is produced by rarefied air, created by the combustion of gas, being made to pass through a small box containing hydro-carbon fluids of a highly volatile nature, and which air, in so passing, becomes charged with hydro-carbon, and thereby made highly luminous." This sounds like senseless jargon. "Rarefied air produced by the combustion of gas," consists of carbonic acid and aqueous vapor, and all the hydro-carbons in the world will not make it burn, nor will it serve as a vehicle for the hydro-carbons themselves. The "invention" is clearly another carburetting apparatus.

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THE
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PUBLISHED ON 1ST AND 15TH OF EVERY MONTH.

C. ELTON BUCK, ... EDITOR.

FRIDAY, JANUARY 1, 1864.

Opposition gas companies have been "tried, weighed in the balance, and found wanting." At least, so say the people of Brooklyn, and after mature reflection, so say we. We have done bolstering them up, and have become convinced, that instead of accomplishing the benefits claimed for them while in embryo, they have proved, at their birth, to be abortions of ungainly dimensions, and entail disappointed hopes, which are sure to be visited upon their friends a hundred fold. Such has been the case with the Citizens' Gas-Light Company, of Brooklyn, which we instance as the latest case of the kind. The gas war which a few months ago was waged between the two companies of that city, has assumed an entirely new phase. The former combatants, finding that the contest in which they were engaged, was likely to terminate much in the same manner as the celebrated fight of the Irish cats, wisely resolved to conclude a truce, and enter upon a division of the territory which each had been striving to monopolize. So far, so good, for the principals, but not for the partisans of either corporation. These luckless individuals, after having exhibited decided preferences for one or the other of the contestants, were suddenly left to shift for themselves, while they were unceremoniously partitioned out, some to one company, some to the other, all of them being subjected to an increase in their gas bills, and a decrease in the quantity of light. The prices charged by both companies were advanced—the Citizens' going far ahead of the old company in this respect, while the quality of the gas correspondingly diminished. The people of South Brooklyn, lighted by the Citizens' Company, called an indignation meeting, at which decided proofs of disapprobation at the course of the company were given, and some pretty severe talking indulged in. The president of the company published a rejoinder in the Brooklyn papers, giving his version of the difference, and thus the matter stands at present.

When we advocated the Citizens' Gas Company, it was under the solemn conviction that the people of Brooklyn were oppressed—that the trials of the Israelites, under Pharoah, were nothing in comparison. For this, we incurred the odium of the old company, and the maledictions of the old school engineers. And to what purpose? But a brief time has elapsed, when this very Citizens' Gas Company has, by its course, aroused what the old company, in its worst days, never did—public indignation in the shape of an organized meeting of the people! Now, we do not intend to go into the merits of this controversy. We do not know who is right, nor who is wrong, nor do we care to know. The Citizens' Company forced the Brooklyn Company into a division of their territory, and no sooner is it accomplished, than the consumers of the "people's" corporation wish themselves back again into the hands of the "monopoly" which they strove to put down. The "injured consumer" is called upon to relate another tale of imposition, but this time, instead of having an enemy to berate, his cry is—"save me from my friends."

In this city is a case somewhat similar, in the history of the Metropolitan Gas-Light Company. Organized as an opposition gas company to remedy the evils complained of the Manhattan, it soon forces the latter into a division of territory, when suddenly the consumer is lost sight of, the "opposition" becomes a "regular," and the same charges are made and the same regulations pursued, as formerly existed in that district in which they now rule with the absolute sway of a monopoly. What do they care now for the "injured consumer," once so oppressed by the Manhattan—now entirely at their own tender mercy? Nothing whatever. They mean to get as high a price for their gas as they can, and we do not blame them. Injured consumers are myths or humbugs. We used to believe in them, but we do so no longer. Making gas, and buying gas, come under the same laws of production and consumption, demand and supply, as other occupations. There is no sympathy with gas consumers for gas producers; why should there be, *vice versa?*

What the upshot of this new war between the Citizens' Gas Company and their consumers will be, we know not. We should not wonder if some attempt were to be made to organize another new company—a consumers' company. We have heard this course hinted at, but if the people of Brooklyn take our advice they will let all such schemes alone. Their present experience ought to assure them that it is folly to interfere with organized corporations, and that though for a time they may be apparently benefitted by the competition of rival companies, yet the day of reckoning must surely come when they will be left to shift for themselves, and be worse off than if they had let well enough alone, and not dabbled in the mysteries of gas-making, which requires something more than empiricism to bring it to a successful issue.

But, why should any sensible consumer complain if the price of gas be advanced? With gold at a premium of over 50 per cent.; with labor nearly doubled, and good workmen scarce at that; with iron, coal, bricks, lime—in fact, everything used in the manufacture of gas at exorbitant prices, why is this hue and cry made because the price of gas is raised? Consumers point to the fact that in London and other English cities gas is sold at a cheaper rate than here. Very true. But let any one glance at the relative prices of labor and materials in the two countries, and the reason will be evident. Again, let it be remembered that the gas made and distributed in this city and Brooklyn is incomparably superior, both in chemical quality and illuminating power, to that made in London, and the difference in price will appear much smaller than it seems at first sight.

It has been too much the fashion to assail gas companies on any and every pretext. That they have their faults, we do not deny. That certain companies have overstepped the bounds of decorum and acted in a tone of imperiousness which none but monopolists would dare to do, we admit; and we have soundly rapped them for it. But that they should be made the football of every unreasonable grumbler, to be kicked about at pleasure, is sheer folly, and it is high time that this fact were known.

As we began our remarks about the Brooklyn controversy, we will end them with a reference to the same. The Citizens' Gas Company, having thrown off the guise of partisanship for "injured consumers," can no longer be classed among the opposition, and, we trust, will become firmly rooted and prosper. To the Brooklyn Company too, now that they have settled the differences between themselves and their former rival, we wish unbounded prosperity. These two corporations have each a district of which any company might be proud, and as the population of their city is increasing in a greater ratio than that of almost any other place in the world, the value of their shares must largely rise. We sincerely trust that the troubles between these companies and their consumers may cease, and that the latter will be reasonable in their demands, and remember that while they pay increased prices for every other necessary of life, it is sheer folly to grumble at having to submit to higher rates for light.

HAPPY NEW YEAR!

The swiftly revolving wheels of time have brought us to the opening of another year. We sincerely offer the congratulations of the season to our numerous friends and patrons, and hope that the year which has just dawned upon them may be a bright and auspicious one, and that they may be crowned with success in their several avocations.

SUPPLY OF STREET LAMPS BY METER.—As the controversy on this subject in England has assumed an interesting condition, we give another chapter of the discussion, taken from our able contemporary, the *Sanitary Reporter*. The style of argument used by the disputants is not very mild, and some little irritability is shown, but this in nowise detracts from the merits of the question. We think this controversy will be long-lived, as the subject in dispute is an important one and has occupied the minds of gas engineers for some time.

PHŒNIXVILLE, PA.—This thriving town ought to be lighted with gas. It has a population of more than 5,000 and is the centre of a busy trade and large iron and other manufactories. Why it should have been neglected so long by builders of gas-works is a mystery. No better field can be found, and we hope some enterprising engineer will soon occupy it.

NEW ROCHELLE, N. Y.—The gas-works at this place were formally inaugurated on Thanksgiving night, and a handsome entertainment was provided by the company. Levy's process for making wood-gas is used here.

QUALITY OF LONDON GAS.—Dr. Letheby, in his periodical examinations of the gas made by the Great Centra and Chartered Gas Companies of London, still reports the quality to be bad, and the quantity of sulphur to be more than that allowed by Act of Parliament.

PUBLIC LAMPS OF PARIS.—The public lamp-posts at Paris, which are of cast-iron, are being coated with copper, by electro-depositing, so as to have all the effect of bronze. The large fountains in the Place de la Concorde have recently been taken to pieces in order to be thus covered. The work is done by M. Oudry, at Auteuil, who is carrying on electro-depositing on a gigantic scale. He has recently completed a full-sized copy in copper deposit of Trajan's column at Rome.—*Journal of the Society of Arts.*

ANSWERS TO CORRESPONDENTS.

A.. D., of N. Y.—*The report has not yet been published. As the accounts are brought down to the 31st ult., it will be a week or more before it appears.*

J. C. C., of Mass.—*Many thanks for your favors. The pamphlets were received in due season.*

A. P. B., of Pa.—*The office of the company is in Boston. The reputation of the concern is very good.*

W. B., of Ohio.—*The third edition of Clegg is the latest work out. It is an expensive book, but well worthy the money asked for it. Hughes is the best rudimentary work on gas, and it has the advantage of being quite cheap.*

CORRESPONDENCE.

GOSSIP FROM ENGLAND.

The purification of gas has been a good deal talked about of late. More than ordinary attention has been drawn towards it by the sharp contentions and the prolonged and expensive litigation relating to the patent of Mr. Hills. Priority of discovery, or of invention, is difficult to establish. If many minds be at work upon similar objects, the filaments of thought get so intertwined that it is impossible to know what is original, what is suggested, or what is unconsciously appropriated. Dates, and names, and places may be readily quoted; but the mystery is not revealed. These are among the vexations and the disappointments which accompany the fertility of invention—the tear and wear which so frequently goes unrewarded.

All legal restrictions being removed, by the refusal of the committee of the House of Lords to extend the term of the patent, and which expired at the end of this month, there is no doubt that the oxide of iron process will be more generally adopted. Falling into the hands of a greater number of operators, it will be better understood and quickly improved upon. Intimations have already been given of improvements; not so much, perhaps, in the primary application of the oxides as in the economical recovery and application of what have hitherto been waste products.

But we are not going to say "good-bye" to the lime process. It has held the first place, and deservedly so, in the manufacture of gas. The substitution of oxide of iron for lime is more a question of locality than of economy. It has been forced on by the difficulties in disposing of the foul (spent) lime, and the inconvenience (in sanitary language called *nuisance*) it has been to those living in the neighborhood of gas-works. That complaints have been made, and stringent regulations enforced, is not to be wondered at. There may be nothing actually injurious to health in the offensive odors diffused by some of the products of gas purification; but they are not agreeable to the senses.

Wet lime purification is now very little known, and where it still exists it is always in combination with the dry process—Phillips' hydrate of lime. Where lime is cheap, and the refuse can be sold, given away, or thrown away, without annoyance to others, there is no inducement to have recourse to oxide of iron. At present, lime is belived to be cheapest; and it has the additional advantage of arresting carbonic acid gas, which oxide does not. But favorable conditions this year may be unfavorable next. The rapid growth of gas manufacture is one cause, and, in many instances, the still more rapid increase of buildings in the vicinity of the works is another, why that which was quietly endured at one time is not to be tolerated at another. It is not difficult to foresee that the lime process will be gradually displaced by the oxide process; or, what is as likely, by some other material yet to be discovered. One of the benefits, in an economical sense, of the oxide process, is the comparatively small quantity of the material, as compared with lime, which does the same amount of work; the readiness with which sulphur and ammonia can be recovered, and the revivification of the spent oxide, fitting it for doing its work as effectively again.

The street-lamp question is not settled, and not likely to be just yet. Fierce contentions break out almost as soon as the subject is mentioned. Mr. Hughes has his motives, and works away very quietly in promulgating them. He is the advocate of the meter system, but only in a restricted sense—one meter for every tenth or twelfth lamp; the mean rate of consumption to be determined for all the lamps by the mean average rate of those with meters. The supply of gas is not to be left to the will nor the discretion of lamp-lighters, but to be controlled, as well as it can be, under the circumstances, by double taps and adjusted burners—the rates of consumption being agreed upon between the officers of the gas companies and of the corporate or other authorities. This system has been in operation in a few places for some years, and has given satisfaction. Careful and frequent examination of meters, burners, and rates of consumption are necessary; and of equal importance is a good understanding among the officers of the contracting parties. The average system is extending. It is something in advance of the old method of charging at per lamp; and if the gas companies were in earnest in trying to get rid of the contract system, it would soon come to an end.

The editor of the *Journal of Gas Lighting* is down upon Mr. Hughes at every movement he makes, trying, with all his might, to oppose the newly-proposed arrangements, but confessing that the meter system is the only right system, and that there should therefore be a meter to each lamp. It is a matter too important to be spoiled or delayed professionally by antagonism. Those who really understand such things, and profess to be teachers and guides of others, should know how to practice mutual forbearance. There is space enough for the expression of opinions, however various or directly opposed to each other; but they are more respected, and more likely to be examined, when expressed with moderation.

A stir has been made about the street lamp supply, and something will come of it. But it is a slow movement. The contract system began wrong, has continued wrong, and never can be put right. It is as far behind other parts of gas-lighting as the road-wagon is from the express train. S. G.

——— *England, Nov. 26th*, 1863.

ARTIFICIAL ILLUMINATING AGENTS.

In a land where the benefits of education are so widely diffused as in this country, where intelligence is so striking a characteristic of the people, and where the enjoyments of the domestic circle are so highly prized, artificial light is a very important element of comfort. Instead of being a mere luxury, it may be regarded as an absolute necessity—one of those indispensable requirements of our existence, whose loss we should deplore as one of the greatest deprivations which could possibly befall us. This necessity being palpable, it will be admitted that the only wise policy to pursue in supplying it, is to resort to that source of artificial illumination which presents the strongest claims on our attention, in the essential particulars of convenience, safety, and economy. The object of this paper is to examine the relative advantages and disadvantages of the artificial illuminating agents generally adopted in this country, and after impartially considering their claims, to make such deductions as may be warranted by a study of their comparative merits.

The substances which are commonly employed in the United States for artificial illuminating purposes, are the following: Tallow, adamantine, sperm, wax and paraffin candles, whale oil, lard oil, sperm oil, burning fluid, camphene, kerosene oil, and gas.

Tallow candles are extensively used, particularly by the poorer classes, throughout the country. Being sold at a lower price than those made of any other material, the demand for them is always great, and in country villages and in sparsely settled regions they form an important article of trade. They are made from the fat of animals—usually that which is located under the skin in the vicinity of the intestines and kidneys, and in the bones and muscles. When tallow is first obtained it has a very unpleasant smell, arising from the portions of animal tissue, blood, &c., contained within it. These undergoing putrefaction evolve the odors which are characteristic of crude tallow. In order to remove this, the tallow is *rendered*, or melted, by which the water previously contained in it is dissipated, and the animal tissues and bloody matter rise to the surface, whence they are removed. The tallow thus prepared is used for candle stock. The manner of moulding candles is too familiar to need explanation here, and, indeed, it is beyond our province to enter into any details of the manufacture, but only to consider the finished articles, or, at most, to explain the characteristics of each.

Tallow candles, frequently called mould candles, are found in the market in sizes of six and eight to the pound, called respectively sixes and eights. The objectionable features attending their use are well known. Their disagreeable smell, their greasiness and property of soiling the hands, and everything with which they come in contact, are familiar to all who have employed them. Owing to its low melting point tallow requires a large wick, which draws up the melted fat as soon as formed, and the result is a large smoky flame. In addition to this, the wicks of tallow candles are plaited in such a manner as not to bend out of the flame, but they remain upright, and thus the flame is dimmed, and constant snuffing is required. Moreover, in carrying a lighted tallow candle about the house, sparks of fire are liable to fall from the half-burned wick, which may do incalculable damage. Those who, from motives of necessity, are constrained to use tallow candles as illuminating agents, will assent to the validity of these objections, and their experience may suggest even other drawbacks which we have failed to enumerate. A few words on this subject from Professor Brande, of England, will not be out of place in this connection:

"By whatever means the tallow may be made to envelope the wick, the objections to tallow, as a candle-making agent, remain. The substance being composed of two fatty bodies—one oily and the other hard—the resulting candle is devoid of homogeneity. The soft part melts first, thus causing the formation of channels around the burning candle, a result termed '*guttering*.' Nor is this the only objection to tallow candles; the material of which they are composed is not mere tallow, but it contains shreds and fibres of decomposing animal tissue, which evolve a disagreeable smell. Add to these disadvantages the necessity for snuffing which tallow candles require, and enough will have been stated to show the desirableness of finding a substitute."

But enough has already been said to show the various objections attending the use of tallow candles. An argument appealing more directly to the perception of consumers is that wherein their relative cost, when compared with other illuminating agents, is demonstrated. If this be investigated in the proper manner, it will be found that tallow candles, in proportion to their illuminating power, will be found among the most expensive illuminating agents used.

Next among candles in the upward scale of progression are those known as adamantine or stearic acid candles, also denominated by some factors star candles. From the designation "*stearic acid candle*," it might be deemed that all candles known by this name were made from stearic acid alone. A wider acceptation, however, has been given to the term, which now includes all candles made from solid fats, in whatever manner they may have been prepared. We have seen, in describing tallow candles, that the fat stock used in their manufacture is not homogeneous in its nature, that is, it is used as it comes from the animal, being merely subjected to the process of rendering. Hence the candles made of this material are composed of two or more fats, of different melting points, and having other diverse properties. The investigations of Chevreul and other chemists proved the complex nature of fatty matters, and demonstrated that, instead of being simple substances, they are really *salts*—compounds of acids and bases. All fats consist of two or more proximate elements—*olein*, which is the oily or fluid portion, and *stearin*, *margarin*, *palmitin*, &c., which constitute the solid portion of the fat. These substances are all compounds of an acid, with a base known as *glycerin*, the acids being termed respectively oleic, stearic, margaric, and palmitic acids. These acids have a range of affinities similar to that exercised by other acids, and advantage is taken of this fact to separate the original fat into its proximate constituents, and to "*split*" it, in order to produce a candle stock which shall surpass tallow in hardness and value, and be free from the disadvantages which we have seen to be inseparable from that substance. This is effected by the process of *saponification*, by which the normal constitution of the fat is broken up, the fatty acids are separated from their natural base, glycerin, and are made to assume new relations. The process of this manufacture is fully detailed in Morfit's—"Chemistry Applied to the Manufacture of Soap and Candles," which is the best treatise on the subject extant. Suffice it to say that stearic acid, when properly prepared, is a white inodorous solid, not greasy to the touch, and, when pressed, resembling ivory in its appearance. The candles made from it are extensively used, and, possessing many recommendations, they are deservedly popular. They are, however, not free from objections, as they require considerable care and attention, and when carried about, unless great care be exercised, are apt to drop sparks, although not so liable

to this objection as tallow candles. Adamantine candles are generally found in the shops moulded in various sizes, but those of six to the pound are more common than the others. The material of which they are made being harder, and having a melting point several degrees higher than that of tallow, the wicks are of smaller calibre, and consequently the flame is not surcharged with particles of unburned carbon, as is often the case with tallow. These wicks are so plaited as to bend over and project through the side of the flame, whereby the oxygen of the air coming in contact with the incandescent wick, it is entirely consumed, and, as a general rule, snuffing is not necessary to be resorted to, although the wicks of some adamantine candles need considerable attention, and unless watched, "thieves" are apt to form and cause the candle to gutter and run, and thus give rise to much positive inconvenience, as well as entail loss upon the consumer. As regards the money value of light from adamantine candles, it is far below that of some other illuminators.

Sperm candles are made from spermaceti, which is obtained from the great spermaceti whale (*physeter macrocephalus*), and also from some other species of *physeter*. The spermaceti is found in all parts of the body of the whale mingled with the blubber, but the greater portion is obtained from the cavity of the head. This is immediately removed as soon as the whale is killed; it is then boiled and strained into casks, in this state being denominated "head-matter." This mixture, in addition to spermaceti, contains a quantity of oil which must be removed. This is effected by successive meltings, granulation, and pressure—in the latter of which operations steam heat is used, and a weight of several hundred tons brought to bear upon the mass. The purified spermaceti is then cast into blocks, when it is ready to be melted for candle stock. When pure, spermaceti is a white crystalline solid, with a semi-transparent lustre and a soapy feel. Its melting point is about 120° F. Owing to a tendency to crystalize on cooling which this substance possesses, about three per cent. of wax is melted with it. Sperm candles are usually met with in boxes of six to the pound.

The appearance of these candles is familiar to all. Their hardness, cleanliness, freedom from guttering, and absence of all unpleasant odor, constitute recommendations of the most favorable character. Besides this, the luminosity of the flame and the perfection of their combustion place them on an equality with the best candles known. Sperm candles burn with remarkable uniformity, and this quality, as well as their cleanliness, has led to their being adopted as the standard in photometrical observations. The standard candles constructed for this purpose burn at the rate of 120 grains per hour. The sperm candles of various makers as met with in the shops, vary from 120 to 140 grains of hourly consumption. A very serious objection to them, which has retarded their more general introduction among the people, is their high price. Nor, from present indications, is there any reason to suppose they will ever be afforded at a lower cost. The growing scarcity of the sperm whale and the lively competition which has sprung up among coal oils and other illuminating agents, has had a tendency to lower the price of the latter, and thus to divert the attention of the public. The probability is that all kinds of candles have had their day, and the gradual adoption of other substances will lessen the demand for them for home consumption, although a supply will probably be needed for foreign markets.

Wax candles have been immemorially used, and have, by general assent, been regarded as the type of perfect illuminators. They are first mentioned by Pliny, who describes them as flax threads covered with pitch and wax. Their high price has precluded their general adoption by any but the more wealthy classes, and even by these sperm candles have been, in many instances, preferred.

The origin of wax is well known. It is obtained from honeycomb, which is a secretion of the honey bee, formed between the abdominal scales of the insect. In order to prepare it for use the comb is drained to free it from the honey, and then boiled in water, by which it is melted and rises to the surface. It is then allowed to cool, when it appears as a brownish yellow cake—the crude wax of commerce. Before it can be used for candle stock it must undergo the process of bleaching, which consumes much time, and adds materially to the expense of the candles. After being bleached it is cast into thin cakes, when it is ready for further manipulation. Although pure wax is used for the manufacture of candles, a mixture of different proportions of wax and stearic acid, or wax and spermaceti, is often employed. This admixture is used to tone down the expense of the product, which would else be still higher in proportion to the other materials we have been considering. The candles made of these mixtures are sometimes called *composite* candles.

Owing to the tendency of wax to contract on cooling, and to adhere to the sides of the moulds, candles made of this material are not moulded, but the wicks are covered with the melted wax by *basting*, or successive applications of melted wax poured over the prepared wicks, and after the proper size has been obtained the rough candle, while hot, is placed upon a walnut table and rolled with a smooth slab of box-wood, which gives to it its proper shape. On a wax candle being broken, annular layers may be observed, the number of which indicates the number of times the basting operation has been performed.

Wax candles are rarely found to exhibit a perfect uniformity of combustion. Their hourly consumption varies from 135 to 175 grains. They are very expensive, and are regarded as an article of luxury rather than of prime necessity, even where gas-light is not to be found. They are among the most expensive illuminating agents known.

Paraffin Candles.—Within the past few years paraffin has been used as a material for candles. This substance, from its beautiful pearly appearance, its freedom from odor and greasiness, and the vividness of its light, has been highly commended. Paraffin is one of the numerous family of hydro-carbons, and is composed of four equivalents of carbon and four of hydrogen. It is largely prepared in England and this country, under the patent of James Young, its principal source being boghead and other bituminous and cannel coals, and also some varieties of petroleum, from which it is separated by distillations, and subsequent refrigeration and mechanical pressure. Paraffin candles are somewhat apt to soften and gutter while burning, and this feature constitutes an objection to them. Moreover, the quality of light emitted by them is very much affected by the wick, which if small produces a clear and brilliant light, free from smoke, while if a large wick be used, the flame increases in size and becomes yellow and very smoky. We do not know whether the paraffin candles in the market are made wholly of that substance, or whether they contain portions of other candle stock, as wax and the fatty acids generally are miscible with it in various proportions. Notwithstanding the many advantages to which paraffin candles may lay claim, they are not likely to ever become very extensively used. Owing to some imperfection in their manufacture, the wicks often splutter, and burn with some irregularity. Their cost, too, is an objection which will retard their general adoption.

Whale Oil.—Under the denomination whale oil or lamp oil, oils from a number of species of fish and other marine animals, are used for burning in lamps. The consumption of these oils has decreased in a great ratio during the past few years. A number of causes have operated to produce this effect. The whales themselves are not so easily met with as formerly, and as a consequence the oils are more scarce, and the price higher than previously. In addition to this, the substitution of gas, lard-oil, and more recently kerosene-oil—each of which is far preferable to fish oils—has lessened the demand for them, and partially driven them out of the market.

The nauseous odor of lamp-oil, its poor illuminating power, its liability to encrust the wick, and the almost utter impossibility of buying a good article, are familiar to most consumers. Besides this, the trouble in taking care of the lamps, trimming them and preventing the smoking of the oil, as well as the accidents arising from spilling it upon the floor, and soiling the carpets and other furniture, convey an idea of discomfort and inconvenience, ungrateful to the tidy housekeeper to the last degree.

A number of lamps, of different constructions, have been used for burning fish oils, but the ordinary household lamp, with two cylindrical wicks, is more commonly used than any other. The cost of lamp-oil burned in one of these lamps will be found to exceed that of several other illuminators, and to suffer by the comparison in other particulars.

Lard Oil.—Much preferable to fish oil in every respect is lard oil, which, as its name indicates, is prepared from hog's lard. In the Western States particularly, the production of this article forms a prominent item of manufacture, and a large amount of capital is invested in it. Although this oil may be burned in ordinary lamps, with but a slight adaptation in the wick tubes, yet it is generally prefered to use it in a lamp having an argand burner and chimney. Consumed in this manner, when oil of a good quality can be procured, it burns with great regularity, emitting a soft and pleasant light, well adapted for the social circle or the student's desk.

Sperm Oil is generally considered as the type of superior animal oils, both for burning and lubricating purposes. It is obtained from the fat or blubber of the great spermaceti whale, before mentioned as the source of the raw material for sperm candles. The high price which this oil commands, has served to induce dishonest dealers to offer inferior fish oils as the genuine sperm oil, and to so great an extent is this fraud practiced that purchasers are by no means certain of obtaining the pure sperm, at even the high price it brings. This oil is now seldom burned by private consumers as an illuminating agent. It is, however, still extensively used for the light house service, and is considered the best substance for this purpose known. Experiments are now in progress in England, to ascertain whether gas in some of its forms may not be advantageously substituted for sperm oil.

Burning Fluid.—It is difficult to find words which are expressive enough of the highly dangerous character of that vile compound known as burning fluid. This substance, which is a mixture of alcohol and turpentine, notwithstanding its tendency to explode, was, prior to the blockade of the Southern ports, extensively used all over the country, by all classes of people, some of whom depended upon it alone for artificial light. It is astonishing that this dangerous stuff was so universally employed. Despite the repeated warnings and monitions of the most emphatic nature, the use of burning fluid continued, and, like a second Pandora's box, sent forth calamities without number. It would be difficult to find a proof of more culpable temerity than that afforded by the persistent use of this substance. Ignorance of its effects could not be pleaded, for scarcely could a newspaper be picked up, but the eye met with announcements of fatal accidents resulting from the explosion of burning fluid lamps, whereby life after life was sacrificed, and thousands of dollars' worth of property destroyed, the result of stolid indifference, or thoughtlessness equally criminal. Could the imagination faithfully portray the large number of victims of burning fluid explosions, and listen to the tale of their sufferings, no additional testimony would be required to procure its utter prohibition, and to accomplish the substitution of other and safer illuminators.

Under no circumstances is it safe to use burning fluid as an illuminating agent. Wherever it is found, danger to life and property always lurks within it. Explosions have frequently occurred under circumstances which seemed to assure almost absolute safety. The greater number of accidents have been the result of attempting to fill lamps while burning, but many have occurred when all ordinary precautions were observed, and an explanation of the immediate cause difficult to obtain. Accidents have frequently occurred from handling this dangerous stuff in broad daylight, from the vapor becoming ignited from a stove or fireplace. Even when used with the greatest care, and every precaution observed to avoid danger, explosions have occurred, and death has secured victim after victim.

Some consumers, whose best apartments were illuminated with gas, used burning fluid in their servants' rooms, and employed it as a portable light in going from one apartment to another. This course was even more unwise, in some respects, than where the fluid is burned under the immediate supervision of the householder. Servants are proverbially careless, and would

be quite likely to avoid those precautions which would suggest themselves to the members of a thoughtful family, while the use of fluid lamps for portable lights increases the liability to explode—lamps always burning more uniformly and with less consumption of oil when stationary. Fortunately, if the Southern blockade has accomplished no other good results, it has so augmented the price of turpentine as to place it beyond the reach of private consumers, and comparatively little burning fluid, properly so called, is now to be met with. The price of turpentine and other resinous products of the pine, has increased enormously, and a total revolution has been created in consequence, in artificial illuminating agents. Burning fluid has been almost wholly replaced by kerosene or coal oil, which is now so largely produced, and which now is more extensively used than any other source of artificial light.

The advantages claimed for burning fluid are, that it is cleanly, it is easily lighted, and the lamps are readily kept in order. But here the recommendations cease. The extreme danger attending its use, should alone banish it from the houses of all sensible persons, while its expense, at present prices, places it almost out of the category of illuminating agents.

Camphene.—This substance was formerly burned to a considerable extent in lamps peculiarly constructed for it. It consists of purified oil of turpentine, and burns with an intense white flame, which is extremely liable to smoke unless great care be exercised by properly regulating the supply of air necessary to combustion. The lamps in which this substance is usually burned, are constructed with an argand burner with an outer cylinder or cone, which throws a current of air obliquely against the flame. At moveable button of the same diameter as the wick, and situated immediately above it, is attached to the lamp by which the height of the flame may be regulated at pleasure. Camphene was employed for illuminating public halls, churches, bar-rooms, &c., but was not much used in private houses. Its tendency to smoke is a great objection to it, and where true economy is considered it will be found impolitic to employ it. This substance, in common with burning fluid, has had its sphere of employment almost entirely cut off by the enormous price it commands in consequence of the war.

Kerosene Oil.—Kerosene, or coal oil, has been introduced but a few years. It is distilled from bituminous and canel coal, asphaltum, and also from petroleum, or rock oil and other substances of a similar nature. The manufacture and sale of kerosene oil have increased with wonderful vigor, and the market which has been created for it demands a constantly increasing supply. The discovery of the oil wells in Pennsylvania and some of the adjoining States, and the large amount of crude petroleum obtained from them, have given a still greater impetus to the business, until it has assumed gigantic proportions. Formerly the oil was distilled wholly from coal, but since the discovery of the oil wells above alluded to, a large number of manufacturers have preferred to use crude oil pumped from them, by which a saving in apparatus is effected. The mode of the manufacture of this oil is essentially similar in all establishments, although different factors have individual preferences, and vary in minor details. The crude oils are exposed to successive distillations at low temperatures, but as these matters have been fully explained in the columns of the AMERICAN GAS-LIGHT JOURNAL, it will be needless to enter into details here.

Kerosene oil, when properly made, has many advantages as an illuminating agent, and in point of cleanliness and convenience, it is second only to gas. It generates a vivid light; it is very cheap, and in many particulars it is a satisfactory source of light. It is now probably more extensively used throughout the country than any other illuminator, and it is but fair to say, that it performs its office acceptably and at a slight expense.

The variations in the forms of lamps used in burning kerosene oil, are almost numberless. Lamps of all conceivable designs and shapes have been patented—some for burning the oil without a chimney. These latter have never given complete satisfaction. The chimney lamps still retain the ascendancy, and despite the trouble arising from replacing broken glasses, and cleaning them from the smoke which will deposit on them, they will probably be used to the exclusion of all other forms.

The cheapness of kerosene oil has had a depressing effect upon some gas companies in the country. It cannot be doubted that light can be obtained from this agent at a less cost than gas-light at present prices. But when the relative illuminating power of the two agents is taken into consideration, the balance must be declared to be in favor of gas, and the latter, by reason of its superior cleanliness, convenience, safety, and freedom from trouble, must be awarded the palm of excellence above all other competitors.

A few years ago, quite a number of explosions of kerosene oil occurred, while being burned in lamps. Some of these explosions were attended with disastrous fires and loss of life. These accidents arose from the oil being improperly refined, the benzine, naphthas and other light bodies not having been removed. The clamor which was raised at the result of these casualties was sufficient to induce manufacturers to exert more care in the preparation of their product, and now very little danger is to be apprehended from this source, although occasionally imperfectly refined oil will make its appearance in the market.

Last, but not least in the list of artificial illuminating agents is coal gas, which is too well known to our readers to need more than a few words of mention here. We will conclude these remarks by a few quotations from Mr. Rutter's little work, on the advantages of gas in private houses:

"Requiring no preparation on the part of the consumer, gas yields its light at a moment's notice, which can be increased or diminished with ease and exactness as circumstances demand; retiring, with the rapidity of thought, when its services are no longer needed.

"A saving of time is effected, and the labor of servants is lessened, where gas is used; there being no candlesticks nor snuffers to keep clean, nor lamps to trim; whilst the furniture being no longer soiled by the droppings of tallow and oil, requires to be cleaned and renewed less frequently than before.

"As respects safety, also, the claims of gas to public confidence are indisputable. No sparks can by any possibility be diffused by a gas-light as by candles and lamps when they are being lighted, trimmed or extinguished; and the gas-burner being a fixture, the danger occasioned by carrying lights from place to place, by leaving them in improper situations, or by suddenly extinguishing them, by blowing upon the wicks, is entirely avoided.

"The odor so peculiar to coal-gas is often urged as an objection to its use. A stronger ground of objection would exist if it were entirety deprived of that odor. Its presence in an unburnt state is thereby infalliably indicated, and a fair warning given that something is wrong, which should be immediately remedied.

"It is a condition accidental, not necessary, to the use of gas that it occasionally escapes when it is not required, in which respect it might be said to resemble water, beer, wine, and other liquids for whose conveyance and management pipes and stop-cocks are requisite. By many years' experience I know that it is perfectly easy to use gas in every apartment of the house, without its occasioning the least inconvenience.

"An occasional escape of gas, in ever so confined a room, is not accompanied by any injurious effects upon the health of those who may happen to inhale it. Some people fancy that they are in danger of being poisoned or suffocated the moment they detect the odor of gas; whilst they never complain of odours which are far more disagreeable and deleterious, occasioned by the negligence of their own servants, by cesspools or uncleansed drains and sewers in the vicinity of their dwellings, and by crowded and ill-ventilated apartments.

"The workmen employed in the manufacture of gas are, as a class, remarkably healthy. In the performance of their ordinary duties, many of these men daily inhale considerable quantities of both pure and impure gas; but I have never known an instance in which, in such cases, it has operated injuriously.

"A very common objection to the use of gas in private houses, is that the heat generated by its combustion is insupportable, and that ceilings and picture-frames are liable to be discolored.

"The products resulting from the combustion of gas are precisely similar to those from wax, tallow and oil; and if the former be perfectly pure, and dispensed under proper management, there will be less risk of discoloration of the walls and ceilings, or of injury to the most delicate or costly articles of furniture, than from candles or lamps. * * * * *

"When gas is consumed under the most favorable circumstances, that heat generated is nearly in equal ratios with the light obtained; and the heat from tallow, wax, and oil, under similar circumstances, is also very nearly in the same proportions as from gas, the light in each case being equal."

But it is useless to expatiate further on the superiority of gas over every other form of artificial light. The readers of this JOURNAL are too well acquainted with its merits to require any further illustration here. The subject is left to their consideration with the hope that the *resume* of the various illuminating agents used may not prove uninteresting, and that it may serve to show the value possessed by gas, when compared with the other agents mentioned.

THE WASTE OF COAL.

BY PROFESSOR D. T. ANSTED, M A., F. R. S., &C.

A few remarks in Sir William Armstrong's recent address to the members of the British Association assembled at Newcastle, have directed attention to a very important question connected with that valuable source of wealth and power contained in the various coal fields of Great Britain. It is generally admitted, that with reasonable care, and assuming the extent of development of mining resources and application of machinery we are fairly entitled to assume, there is practically no danger of the rapid and sudden failure of our coal. But it is equally certain that, if the total quantity annually raised and accounted for continues to increase at the present rate for several years longer, many of our great manufacturers must, within a calculable time at least, shift their station, and changes must take place the contemplation of which is not pleasant to those now largely interested in the northern manufacturing towns. No doubt all change will be gradual, but so many parts of the old northern coal fields of England are already showing signs of approaching exhaustion, that our friends there are slightly nervous on the subject, and are not fond of having it even discussed.

But it is not so much the natural and proper use of coal that it is my object to discuss in the present article. It is to the improper and unnecessary destruction of this great wealth—the waste of whole beds of coal not worked—the waste of large parts of beds that are worked—the waste of large quantities of what is not only extracted, but part of which is daily brought to the pit mouth and left there to rot—as well as the great waste of coal used as fuel, for want of chemical knowledge, and from the neglect of reasonable precautions in the construction of chimneys and furnaces:—it is to these that I now desire to attract the attention of my readers. The latter cause of waste was referred to by Sir William Armstrong, and does not strictly belong to our subject; but there can be no doubt that the clouds of unconsumed fuel that thicken our atmosphere, and render English towns so dirty, are as much a discredit to the ingenuity of Englishmen, as it would be if our farmers used sugar as a manure, or if we were in the habit of employing beer instead of water to turn our mill-wheels.

I have named three distinct sources of waste of coal, and all who are familiar with coal mining, must be aware that each of these three involves serious loss and a crying evil. I believe that each might be remedied, and, objectionable as restrictive laws always are in industrial occupations, it really seems as if the only means of checking this constant mischief is to be sought in some act of the Legislature.

The first waste is that of whole beds of coal. It is by no means unusual in some mining districts, if there happen to be two or three tolerable seams overlying one better seam, to sacrifice the former because the latter obtains a higher price and pays better for working. Wherever this is done, the overlying beds are destroyed, for after the lower coal is exhausted, the upper strata must came down irreg-

ularly, and any such matters as two-foot or yard seams of coal, already perhaps tender and not very good, are crushed and rendered utterly useless. Even when the circumstances are most favorable, as where there is an excellent stone roof and a good tough floor, the crush and corresponding creep affect all the beds to the surface, and produce cracks everywhere, admitting both water and gas, and any attempt to work these upper beds, when the lower ones are gone, is almost sure to end in failure. Perhaps after many centuries and exposure to various influences, the coal may be reconsolidated, but this is a doubtful and a distant provision, whereas, if all the workable beds were always taken in regular order from above downwards, nothing of this kind could happen.

It is clear that, notwithstanding the total destruction of all this coal, it may be that the advantage of removing the valuable seam immediately, is so great both to the landlord and miner, that both agree to the loss; but it ought not to be forgotten that mining property under the surface, like the land itself, really belongs to the community, and is held for use, not for destruction. Any absolute destruction of that which belongs to all the inhabitants of a country for all time, should not be permitted, and here therefore it would seem that restrictive laws might fairly be enacted to prevent the incidental waste of coal that may hereafter, if not at present, be worked profitably.

The second waste alluded to, is that of not removing important parts of a seam, generally a thick seam, because it is found cheaper to sacrifice a foot of coal at the roof, and perhaps another foot on the floor, rather than go to the expense of holding up a bad roof. So also it is found advisable sometimes to leave large pillars of coal to be crushed to powder, rather than use the heavy timbering, or construct the stone walls that would be needed to prevent it. In some cases, nearly or quite one half a valuable seam is thus sacrificed. The time will come when all parties will regret this waste, but meanwhile I suggest whether it ought not to be checked by law. It is rarely—perhaps never—necessary, and it would be wiser to wait till it is worth the expense to mine it properly and get nearly the whole, than thus sacrifice half in order to save a trifle in getting the other half. At any rate, if this would not be convenient to the present landlord, it would be just to his successors, and I suggest that to prevent so mischievous a destruction of public property, interference is desirable and justifiable.

The systems of working coal vary extremely in the various districts. In some they are well imagined, and involve as little waste as possible; in many, however, they are designed and carried out by men of no general knowledge, no education, and no knowledge of the special conditions under which coal exists in the earth. They merely carry on the methods they have learnt as boys by a rough rule of thumb, improving nothing, modifying nothing, and caring for nothing but an immediate return sufficient to pay them. Surely these are not the men on whom the management of so important a part of our national wealth should be allowed to depend. These are not the men to whom the laying out of a new mine should be intrusted; for much judgment is needed for this purpose if waste is to be prevented.

The third waste alluded to is that of small coal or dust, left either underground or at the pit mouth, and regarded as of no account. All, or at least a large part, of this is capable of use with the exercise of a little ingenuity. In some countries it is all utilized; in England it is all neglected. The quantity thus wasted where the coal is tender, is exceedingly large, but cannot readily be estimated. It is waste in the strictest sense of the word—unnecessary and undesirable—and occasionally it is even burnt to get rid of it. By washing and making up with fire-clay into balls, all this might be valuable fuel and save other coal.

Coal is not like the vegetable soil of a country. We cannot, by any system of manuring, return to the various strata the carbon in a state fit to form beds of coal that will serve our posterity. Once used it is done for, and we must seek other sources of supply, or use other means to obtain heat. This is a very serious reflection, and one that ought to induce those fortunate enough to possess coal property, to submit to regulations by which their property will be made most profitable in the long run to their country and themselves. It is to be hoped that this great subject will be attended to, so that a discussion may be raised on it that may terminate in the introduction of some useful measure of legislation. All honest and well meaning proprietors and miners would agree, if they could be induced to consider the matter fairly, that their own immediate interests are concerned in this, and that the future prospects of their mines, and the very existence of their property, really depend upon it.

I have carefully avoided any allusion to particular districts. The subject is familiar enough to all who have anything to do with coal-mining, and abundant examples of every kind of waste will suggest themselves but too readily. I do not wish to excite any ill-will or opposition by putting forward a definite scheme, but rather to present the subject to my readers as one on which they ought seriously to ponder. The mining interests in England are so large, and they, as well as the manufacturing interests, are so dependent on coal, that I am sure my readers will feel an interest in every thing connected with the future prospects of our coal fields.—*London Mining and Smelting Magazine.*

PETROLEUM ITEMS.

Wicks for Paraffin Lamps.—One of the most frequent causes of the bad burning of mineral oil lamps arises from the employment of damp wicks. Cotton, like most other vegetable fabrics, readily absorbs from one-sixth to one-fifth of its weight of moisture from the atmosphere; this prevents the free ascent of the oil, and leads to charring of the wick, and the production of an imperfect flame, hence it is exceedingly important that a new wick should be thoroughly dried before it is placed in the lamp. When it has once been saturated with oil the further absorption of moisture is prevented. If our subscribers would point out this small precaution to their customers, both parties would find it of advantage. The trouble of holding a wick before the fire until it ceases to give out any vapor is so trifling as not to be taken into consideration, and the improvement in the flame and the regularity of burning is considerable.

Petroleum on the Health.—It is a fact well established that petroleum has a beneficial effect on the health. It has been remarked that no case of sickness has ever been known to originate from the use of, or a proximity to, the product, notwithstanding its offensive odor. No district of country can be found where the children are so uniformly ruddy-faced and healthy-looking as they are in the Pennsylvania oil region; nor can a class of people be found who enjoy more physical vigor and good health than those who are constantly exposed to the noxious smell of the compound.—*Oil Trade Review.*

Benzine and Coal Oil as Paint Oils.—Linseed oil is undoubtedly the best mixture for paints that are to be exposed to the weather. It absorbs oxygen, and becomes solid and water-proof, and yet it always possesses some elasticity which prevents it from cracking. Oils contain a considerable portion of glycerine, which is hygroscopic fat. It has been found that some metallic oxides possess the quality of combining with glycerine in the oil, and rendering it susceptible of readily drying in the atmosphere. The oxide of lead, sulphuret of zinc, and the oxide of manganese boiled with oils, communicate to them great drying properties, and for this reason oils treated in this manner are called drying oils, and are in common use. Some works recommend the use of both sulphate of zinc and the acetate of lead mixed together for making drying oils. These two metallic salts, when brought together, produce two new compounds by double decomposition; namely, the acetate of zinc and the sulphate of lead, and the oil is restored to its natural condition. The acetate of zinc should never be employed in paints, because it is a bad drier. The drying of linseed oil has such an affinity for oxygen as to promote chemical union with it and the coloring pigment, and thus destroy the beauty of the color. There are many delicate pigments which cannot be employed with oil in paint without suffering injury. This is the case with chrome yellow, verdigris, gamboge, and a number of the lakes. But wax is a very useful corrective for this deteriorating quality of the oil. Wax is a powerful antiseptic, and has great preservative powers. Added to painters' varnishes, it tends to prevent them cracking—an evil which has destroyed the beauty of many excellent works of art. It is said that Titian painted on a red ground, and imbued his canvas on the back with beeswax in oil. Bleached wax is easily dissolved in hot oils, both volatile and fixed; it is not changed by exposure to the atmosphere, and is but very feebly acted upon by the strongest acids. Its appropriateness, therefore, as a mixture for paints, is self-evident. Many persons mix shellac varnish with common paint, in order to render the latter less expensive, because a considerable quantity of water can be added to the varnish and combined with the paint. Thus, if we take three ounces of the oil of bicarbonate of soda and place it in three pints of soft water, it will dissolve a pound of gum shellac by boiling, thus making a lack varnish. To this is usually added half a pint of alcohol and two quarts of soft water, and it is then mixed with common oil paint. For inside work in houses it may answer, but it should never be applied to the outside of buildings, because it cannot resist atmosphriec influences like paint which contains only oil and a pigment. Gum shellac varnish made with the corbonate of soda does not stand the action of rain so well as varnish for which acohol has been employed as a solvent. It should therefore never be used for any work exposed to the weather. In *Pasmas* it is stated that M. Dusbry, of Antemb, France, has found that benzine and coal oil are the best vehicles for paints of metallic bases (lead, zinc, &c.), as they dry rapidly, and have no smell after the first twenty-four hours.

PATENTS.

UNITED STATES.

40,723.—S. D. Gilson, Syracuse, N. Y., assignor to himself and Joseph Hall, Rochester, N. Y., for a Force Pump:

I claim, first, the arrangement of the two valves, E F, in a cage G, so that the water is both taken into the pump and discharged therefrom, through the said cage, substantially as and for the purpose herein specified.

Second, The arrangement of the cage, G, in a casing, B, which is inserted into and removed from its place in a direction at right angles to the axis of the cage and to the movements of the valves, substantially as herein described.

Third, In combination with the arrangement of the two valves and valve seats in the cage, I claim the fitting of the valves one within the other, in such manner that each constitutes a guide for the other within the cage, substantially as herein specified.

Fourth, The attachment of the valve casing to the cap, C, by a screw bolt, D, or its equivalent, to allow the said casing to be withdrawn with the cap, substantially as herein set forth.

40,804.—Jacques Arbos, of Barcelona, Spain, for a Generating Gases for Heating and Illumination:

I claim, first, The formation of a gaseous compound, as hereinbefore described, and the mixing of the same with gas, arising from the distillation of coal, or from the decomposition of oils, resins, tars, or fatty bodies, to manufacture gas suitable for lighting and heating.

Second, The apparatus for generating the gaseous compound, constructed and acting substantially as hereinbefore described and illustrated in the accompanying drawings.

40,805.—Jacques Arbos, of Barcelona, Spain, for a Gas for Motive Power:

I claim, first, The production of a gaseous mixture composed of oxide of carbon of hydride of azote and of a small proportion of carbonet of hydrogen, said compound being combined with air, and used as motive power, in the manner hereinbefore set forth.

Second, The apparatus for generating the gaseous mixture to be used in the manner substantially as hereinbefore described and illustrated in the accompanying drawings.

Third, The generation of steam by the heating of water in the jacket of the cylinder of the said gas engine and in a boiler surrounding the surface of the said gas generating apparatus, substantially as hereinbefore described.

40,818.—Anthony Chabot, of San Francisco, Cal., for a Filter:

I claim, first, Combining one or more porous tubes with a pipe, B, by means of a flange, a, on the pipe for the reception of one end of each tube, a cap, C, for the reception of the other end, and a bolt, D, substantially as herein described.

Second, In a filtering apparatus constructed substantially as specified, I claim the herein described arrangement of chambers and passages for conveying the water to and from them operating as explained, to provide for the cleansing of the filters by reversing the flow of water through them without reversing or changing the position of the filter or filters.

40,835.—Charles Grath, of St. Louis, Mo., for a Composition for Lubricating:

I claim the production of an axle and machine grease made from paraffine oil with the combination of the substances above specified.

40,847.—C. F. Macy and Seth Martin, of Little York, Cal., for a Hose Nozzle:

We claim a hose pipe provided with internal radical plates, substantially as and for the purpose herein set forth.

40,852.—John Pringle, of Jersey City, N. J., for a Hydrant:

I claim, first, the plug, a, with three passages, g h i, and held in place by the cap, c, over its thick end, in combination with the lever, b, rod, e, slip weight, E, and pipes, B C, all constructed and operating in the manner and for the purpose substantially as set forth.

Second, The weight, E, made in two parts and united by a dovetail in combination with the rod, e, and plug, a, constructed and operating as and for the purpose directed.

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OFFICIAL.

OFFICE OF THE NEW YORK GAS-LIGHT COMPANY,
157 and 159 Hester street, corner of Elizabeth, New York, Dec. 26, 1863.
THE ANNUAL ELECTION for thirteen Directors of this Company, will be held on Monday, the 11th day of January next, from 11 to 12 o'clock A. M., at the office of the Company.
The Transfer Book will be closed until after the election.
THOMAS K. LEES,
Secretary.

OFFICE OF THE METROPOLITAN GAS-LIGHT COMPANY,
Broadway, Corner of Forty-Second Street, New York, Dec. 26, 1863.
THE ANNUAL ELECTION of twelve Directors of this Company, will be held at their office, on Monday, the 11th of January next.
The Poll will be opened at 12 M., and closed at 2 P. M.
The Transfer Book will be closed on the evening of the 28th inst., and be opened on the morning of the 12th of January, 1864.
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Secretary.

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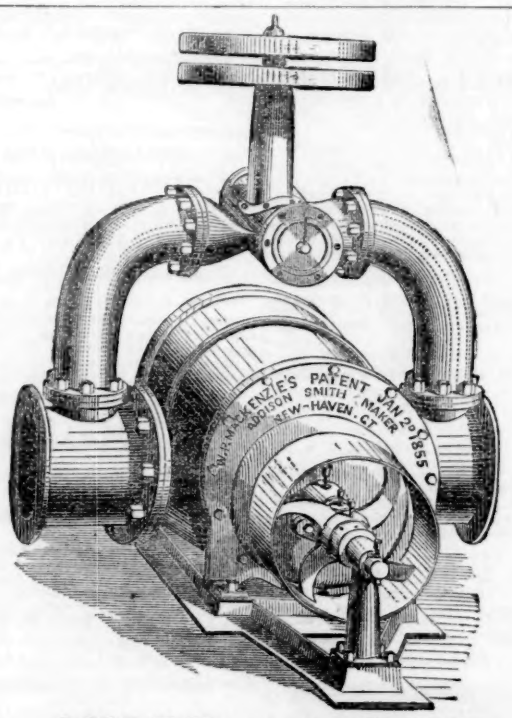

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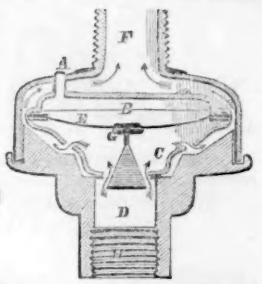
THOMPSON'S

PATENT

AUTOMATIC GAS CONTROLLER.



Notice to Gas Companies and Consumers of Gas generally.

WE RESPECTFULLY INVITE YOUR ATTENTION TO THE FOLLOWING TRUTHFUL DESCRIPTION OF THE construction and operation of this recent and most important invention; its application to every street lamp, and on the fixtures within the works of the Gas Companies, as well as for the use of the general consumer, will be found to effect perfectly and reliably, the object so long sought for, viz.: **a perfect control of the Gas under varying pressures, emitting the Gas at the burner without force, and without increase or diminution of quantity, and hence promoting the highest possible illuminating power of the Gas.**

THE AUTOMATIC GAS CONTROLLER

Is designed to occupy the place of the gas-burner. Within the circumference of a small cylinder, below the burner, is placed a conical valve, attached to a movable diaphragm, the valve and valve seat is proportioned, so that under a supply of Gas, varying in pressure from four-tenths to five inches, the burner will continue to produce the same consumption and development. The unerring accuracy of movement of the Diaphragm at every change of pressure, whether gradual or sudden, and its positive control of the valve which admits, by its proportionate increased or diminished aperture, the same unvarying amount of Gas, has elicited the unqualified approbation of engineers and other experts in the profession.

The simplicity of its construction, and materials used, are a sure guarantee of its durability and continued successful operation. They afford to the consumer of Gas the advantage of a **superior light, with the greatest possible economy**; and for the Gas Company, they control the Street Lamps, affording a more satisfactory light for the public, without waste.

The public are invited to witness its operation, at the Office of the Company; and samples will be sent to Gas Companies for experiment, on application by letter or otherwise.

G. W. THOMPSON & CO.,

Office, 627 BROADWAY, (up stairs.)

A. L. BOGART, Agent, 592 Broadway,

New York.

We are permitted to refer to the following Gentlemen, who have thoroughly examined our Gas Controller:

GEO. H. KITCHEN, Inspector of Gas Meters, 561 Broadway.
CHAS. ROOME, President Manhattan Gas Company.
J. H. ADAM, President New York Gas Company.
PETER COOPER, Cooper Institute.
JOHN A. DUFF, Olympic Theatre.

THE AMERICAN METER CO.,

Organized under the General Manufacturing Laws of the State of New York.

SAMUEL DOWN, President. HENRY CARTWRIGHT, Vice President. RICHARD MERRIFIELD, Secretary and Treasurer.

Trustees.

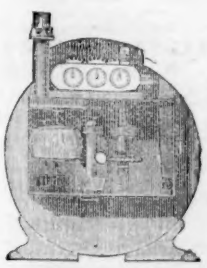
SAMUEL DOWN, WILLIAM HOPPER, R. H. GRATZ, HENRY CARTWRIGHT, RICHARD MERRIFIELD.
THOMAS C. HOPPER, *Superintendent at Philadelphia.*

This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS and REGISTERS, SERVICE and METER COCKS, and all other articles in their line appertaining to the use of Gas-Works.

The combination of Mechanical and Scientific Skill, and the long experience of the several members of the Company, is a sure guarantee of durability, accuracy and excellence of workmanship. Orders addressed

AMERICAN METER COMPANY,

340 WEST TWENTY-SECOND STREET, NEW YORK,
1504 FILBERT STREET, PHILADELPHIA,
1 BARRETT STREET, BOSTON, will meet with prompt attention.



HARRIS & CO.,

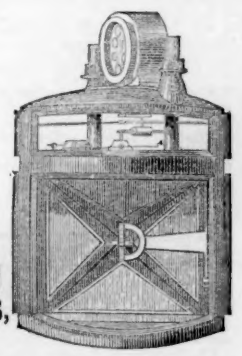
(LATE HARRIS & BRO.,)

N. W. CORNER 13TH & CHERRY STREETS,

PHILADELPHIA,

MANUFACTURERS OF

WET AND DRY GAS-METERS,



METER PROVERS, CENTRE SEALS, PHOTOMETERS, GOVERNORS, STATION METERS, EXPERIMENTAL METERS, PRESSURE REGISTERS, PRESSURE GAUGES, &c., &c.

The firm of Harris & Co., which comprises the senior partner and only practical Meter maker of the late firm of Harris & Bro., will continue the manufacture of Meters, &c., of every description, and will guarantee to furnish an article of Meters equal to the best in the country, at the lowest rates, and combining the latest improvements with great durability and accuracy. The reputation of the Meters of the late firm of Harris & Bro. is confidently appealed to. All our Meters are tested by a sworn Inspector. Terms Easy.

ROBBINS' PATENT WATER, GAS & STEAM JOINT.

THE PROPRIETORS of this unrivalled joint are now prepared to introduce it to general use, and to guarantee that, in all respects, it will fulfil perfectly all the requirements of either water, gas, or steam. It is a joint which remains in all situations absolutely tight.

The following illustrations, with the appended explanations, will give a good idea of the improvement:

Fig. 3.

Fig. 1.

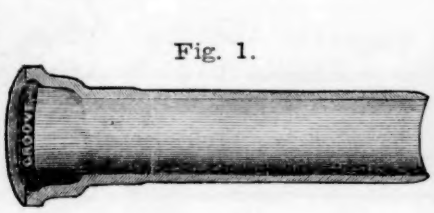


Fig. 2.

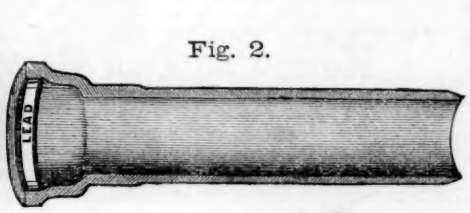


Fig. 4.

FIG. 1. Is a sectional view of a pipe showing a groove to receive a lead ring.

FIG. 2. Is a sectional view of a pipe showing a lead ring in the groove.

FIG. 3. Represents a former, which is used in the bell end of the pipe while casting the lead ring. Before using the former, however, a strip or belt of India rubber is first inserted in the socket, against which the former rests to prevent the lead escaping from the groove while being cast. Upon the cooling of the lead, the former and rubber ring are withdrawn from the socket, and the lead ring is left projecting inwards from the groove all around, forming an indestructible packing to receive the spigot-end of the pipe.

FIG. 4. Shows two pieces of pipe in connection with an hydraulic jack, by which the spigot-end of the pipe (which is cast tapering and may be cast in a chill), is forced into the lead ring in the groove which perfects the joint. A, represents the jack; B, B, the chains by which the pipes are drawn together; and C, C, pieces of pipe.

This ring joint packing may be cast at the foundry or any convenient place, and when delivered at the ditch, may be laid, and perfect joints formed, by any laborer, above or below the surface, or in ditches filled with water, there being *no joint ditching required*, and it can be laid with very great rapidity.

Among the economies realized by this joint may be enumerated, the saving in the weight of the pipe, in the amount of lead required to be used in forming the packing, in the labor of ditching, and in laying the pipe.

The bell or socket may be cast one-half the usual length, as the width of the groove requires, but from a half to one and a half inches, according to the size of the pipe, thus saving in the total weight about two hundred pounds per ton.

The weight of lead required to form this joint, as compared with the amount of lead used in forming a joint according to the old method, is fully seventy-five per cent. less, only so much being required as to maintain the compensating principle, or enough to allow (upon the raising or depressing of the line of pipe out of a direct line) what is lost upon one side of the ring packing, to take its place upon the other; thus securing flexibility of the joint without affecting its reliability. The use of yarn or hemp packing is dispensed with, the cost of which is an entire saving as compared with the old method of making joints.

The saving of labor in ditching is the total amount usually expended in digging joint-holes, there being *no joints to be caulked.*

The saving in labor in laying pipe furnished with this joint is a sum equal to the whole cost of carrying lead, fuel, ladles to the ditches, casting the lead, bailing out water, and the entire labor of caulking, less only the sum charged for casting the lead ring packing at the foundry, which is comparatively trifling. This last-mentioned economy has been estimated by the best engineers at seventy-five per cent., or the same as the saving in the quantity of lead used.

The cost of pipe cast from our patterns is the same per ton as pipe cast for the old form of joint. The principal iron-founders propose to charge the same price.

We have submitted these joints in water-pipes to a pressure of two hundred and fifty pounds to the square inch, and they have remained perfectly tight. It has also been submitted for months in gas-pipes to the ordinary pressure of our city gas-mains, without any leakage whatever. We are aware that these statements may be deemed by many extravagant, but the merits of the improvement warrant them all, and the most skeptical may be fully convinced by an investigation of its value, and by witnessing the tests to which we submit it, or by its use under any conceivable circumstances.

TESTIMONIALS.

OFFICE OF THE WATER COMMISSIONERS,
CITY HALL, JERSEY CITY, October 14th, 1863.

Dear Sir,—On the 26th of May last, about two hundred and sixty feet of cast-iron water-pipes, six inches in diameter, with joints constructed according to your invention, were laid for the Jersey City Water-Works, in Prospect street.

The operation of uniting the joints of the pipes, was performed with remarkable facility, and with an important saving in time, materials, and labor. The joints proved perfectly water-tight, after turning the full head of water on the pipes.

In my opinion, your invention has proved entirely successful, and will be found highly beneficial to water companies.

Yours, respectfully,
ROBT. C. BACOT,
Superintendent and Engineer, Jersey City Water-Works.

MR. R. C. ROBBINS.

ENGINEER'S OFFICE, CROTON AQUEDUCT DEPARTMENT.

Dear Sir,—I have examined your plan for making joints in cast-iron water pipes, and have a report from one of my assistants, of certain experiments made by you, to prove the certainty and economy with which the joints can be made, and their stability when finished.

I think the experiments showed that the joints could be made quite as rapidly, if not more rapidly, than those made in the ordinary method now in use; the quantity of lead used was less than that required in the common joint, and no yarn packing was required. In these respects, your joint seems superior.

After the joints were made, a pressure of three hundred pounds to the square inch, was put upon the pipe in such a manner as to test the efficiency of the joint to prevent both leakage of water, and separation of the pipes from each other longitudinally. This pressure failed to produce either leakage at the joint, or separation, so long as the pipes lay in a direct line; but on deflecting them six and a half inches, in a length of twelve feet, the joint commenced leaking. It is fair to add, that this is a greater deflection than would often be found necessary in laying pipe.

I think the efficiency of the joint in both the points tested in this last experiment, might be increased by increasing the quantity of lead, both in thickness and width.

Altogether, the result of the experiments was such that I have determined to make a more thorough test of your invention by putting down about one thousand feet of pipe, when we commence our operations for the coming season.

The diameter of the pipe subjected to experiment, was six inches, and is the same size that I propose to put down next year.

I am, very respectfully, your obedient servant,
A. W. CRAVEN, Chief Engineer, &c.

To R. C. ROBBINS, Esq., Jersey City.

METROPOLITAN GAS-WORKS,
ENGINEER'S OFFICE, NEW YORK, October 9th, 1863.

Dear Sir,—The undersigned had the pleasure of being present at an experimental test of your patent joint for gas and water pipe, made at the yard of the Croton Aqueduct Department, and cheerfully testify to the results obtained, namely:

First experiment was made with two lengths of eight-inch pipe, jointed together, when a pressure of three hundred pounds to the square inch was applied. This pressure did not force the pipe apart, nor start the joints, but they remained, during this experiment, perfectly tight.

Second experiment was made by deflecting the pipe five inches, which is about equal to eighteen inches in one hundred feet, and the same pressure applied, which caused a small leak at the joints.

Third experiment was made by taking the pipes apart and rejointing them, when the same pressure was applied when lying straight and when deflected; at this experiment there was no leakage.

From these severe tests it is my impression that the superiority of your patent joint has been made manifest, and that it must eventually supersede the old way of jointing pipes together, saving both time and material.

Wishing you success in your enterprise,

I am, very respectfully, yours, &c.,
AMBROSE J. WHITE, Engineer.

To R. C. ROBBINS, Esq.

OFFICE OF THE METROPOLITAN GAS-LIGHT COMPANY,
NEW YORK, October 9th, 1863.

Dear Sir,—Having been present at the testing of your patent joint for gas and water pipe, at the yard of the Croton Aqueduct Department, I can testify to the results as stated by Col. A. J. White, and fully concur with him in the opinion expressed in his letter to you of this date.

Very respectfully, yours,
W. TITUS, Secretary.

R. C. ROBBINS, Esq.

NEW YORK, October 23d, 1863.

Gentlemen,—I am pleased to be able to inform you, that we are fully satisfied that we have done well in adopting your "Improved Joint," in the construction of an aqueduct which we are now building on Oil Creek, Northwestern Pennsylvania.

We have ten miles of three and four inch pipe to lay this season, and, in our estimation, the perfection of the joint, economy in lead, and rapidity with which the pipe can be laid, render it entirely preferable to any other method of laying pipe.

Our Mr. Hutchings advises us that he is putting down the three and four inch pipe at the rate of twenty-five to thirty lengths per hour, with two men in the trench. We are much pleased with this result.

Respectfully yours,
HUTCHINGS & FOSTER.

Messrs. R. C. ROBBINS & Co.

For further information, or for prices and terms, which will be very reasonable, apply to

R. C. ROBBINS & CO.,
No. 197 GREENWICH STREET, NEW YORK.